Southwest Oregon

Late-Successional Reserve Assessment

10/95

Medford District, Bureau of Land Management, Department of the Interior

and

Siskiyou National Forest, U.S. Forest Service, Department of Agriculture

Medford and Grants Pass, Oregon

12 May 2004 Update

This 5/12 update reflects changes in vegetation in LSRs as a result of the Biscuit Fire. Changes in general management strategies since 1995 are also reflected in the update – such as changes in the lists of sensitive plants and animals. Compare the 1995 document to this update, to identify the changes.

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I. Introduction

UPDATE NOTE: In this May 2004 update to the Southwest Oregon Late Successional Reserve Assessment, we primarily endeavored to show changes to LSRs due to the Biscuit Fire. We also incorporated changes in policy or management regimes that have occurred in the last 10 years. Examples: the Forest Service sensitive species lists for plants and wildlife have changed since 1995; changes have occurred in the list of species covered by the Endangered Species Act; some fish species now have special status; management strategies for spotted owl have evolved; modifications have occurred in the Survey and Manage program; techniques for managing prescribed and wild fire have evolved; management of Port-Orford-root disease has changed markedly. This update is not all-encompassing. It was not possible to thoroughly update all sections of the document, due to limitations in time and personnel. For instance, this document does not incorporate all changes in the Forest's ecology program that have occurred in the last 10 years; older forest patch size and interior habitat for late successional forest require additional analysis. Within the text of this document, we have noted ("***UPDATE NOTE"***) sections that should be modernized in a future update or revision. We have tried to present a "fresh look" at how management of the LSRs in Southwest Oregon should occur.

Before the Biscuit Fire, the LS component of all LSRs was lower than desired. The Biscuit Fire caused further reductions in the amount of LS in five LSRs. Within the perimeter of the Biscuit Fire, 67,701 acres of suitable (NRF) habitat for spotted owls was lost (43%) on federal land on the Siskiyou NF and adjacent BLM land, and 117,578 acres of Dispersal habitat was lost (59%) (i.e., 67,701 acres of suitable, and another 49,877 acres of Dispersal-only habitat). Forty-two activity centers for spotted owl were affected. NRF equates to old-growth/late-successional forest, and dispersal equates to young forest.

In 1994, the Pacific Northwest Forest Plan initiated a Regional "Late Seral" network to help maintain the viability of species associated with older forests. ***Our objective is to assess how well the western portion of the southwest Oregon network is functioning.*** Since the network was designed to function in harmony with existing land allocations, lands associated with the Siskiyou National Forest, the Grants Pass and Glendale Resource Areas of the Medford BLM District and Coos Bay District are considered. Like monitoring, assessment is a continuous process, and this document will be revised as we learn and as conditions and needs change.

Although each Late Seral Reserve (LSR) is designed to include as much late seral forest as possible and provide for landscape scale connections, ecosystem analyses at the watershed scale provide specific information on provincial pathways, patterns, structure, and disturbance dynamics (including associated risks). Direct viability assessment (controversial, time consuming and expensive) is not used. Consistent with the Chief's instructions, this integrated, interagency team focuses on habitat quantity, quality, distribution ("coarse filters"), established needs of sensitive species ("fine filters"), and the risk associated with maintaining late seral forests (disturbance dynamics).

Required by the Northwest Forest Plan, this midlevel assessment provides information, not decisions, for Forest and District plan amendments, site-specific projects, and restoration and monitoring needs for management of the Late-Successional Reserve. It dovetails with current ecosystem analysis being conducted at the watershed scale. The scale of this analysis (over 1 million acres) is larger than the scale for watershed (ecosystem) analyses (generally less than 100,000 acres). These multi-scaled midlevel analyses are iterative and are not independent from each other. The following completed watershed analyses have more specific information about their respective watersheds: Althouse Creek (limited issue), Bradford Creek, Briggs Creek, Cave-Grayback Creek, Chetco River (Upper and Lower), Clear Creek, Collier Creek, South Fork Coquille, Coquille River Lower South Fork, Coquille River Upper South Fork, Coquille River (Middle Fork), Cow Creek West Fork (BLM), Deer Creek (BLM), Diamond Creek, Dry Creek, Elk River, Emily Creek, Horse Sign Creek, Hunter Creek, Upper East Fork Illinois River, Illinois

River East Fork, Lower Illinois, Illinois River Below Cave Junction, Illinois River Below Silver Creek, Illinois River Below Briggs Creek, Illinois River West Fork, Indian Creek, Indigo Creek, Kalmiopsis Wilderness (limited issue), Lawson Creek, Lobster Creek, Pistol River, Quosatana Creek, Rogue River Above Gold Beach, Rogue River Above Quosatana, Rogue River Above Agness, Rogue River Above Galice, Rogue River Below Galice, Upper Rogue River Above Galice, Rogue River Marial to Agness, Rowdy Creek, Shasta-Costa Creek, Shelley-Patrick Creek, Silver Creek, Sixes River, Silver Creek, Slate Creek, Slate-Cheney Creek, Stair Creek, Sucker Creek, Upper Sucker Creek, Smith River Upper North Fork, Taylor Creek, Thompson Creek, Wild Rogue, Williams Creek, Winchuck River. Future watershed analyses (such as Upper Euchre Creek) and revisions of existing documents will build upon the knowledge contained in this LSRA document.

A. Goals and Objectives of LSR Assessment

Ecosystem management requires maintaining biological diversity including species viability (ROD, Ecological Principles for Management of Late-Successional Forests, pages B-1 to B-6). Forest and District goals and objectives are consistent with ROD requirements (Siskiyou National Forest Plan and Medford District BLM Plan).

Since species directly depend on habitat, a variety of habitats over time and space provide viability for a range of species including rare and sensitive species and those associated with late seral stages. Successional and disturbance processes have provided a varied seral stage mix and a functional landscape pattern. However, the effects of fire, the most influential process, have been altered and will continue to be modified well into the future.

Management will focus on the amount and distribution of interior habitat, number and size of trees both live and dead (standing and down), on the forest floor and in streams, and canopy density, continuity and layering. Over time, we will determine the needs of indicator species. In the mean time, we will maintain and create elements of older forests.

B. Context of Southwest Oregon LSR Assessment - Landscape Assessment

Regional Setting: Southwest Oregon LSRs are part of a regional network designed in association with other land allocations (riparian reserves, National Parks, Wilderness, botanical areas, etc.) to provide functional late seral habitat, including long-term dispersal and migratory pathways. The Cascade and Coast Ranges provide north-south mid to high elevation routes. Each has its own unique complement of species associated with the inland continental and coastal marine climates respectively. The Siskiyou backbone, joins the two parallel ranges like the crossbar of the letter “H” allowing species from four different directions to come together. In addition, the Columbia and Klamath Rivers, the only two major rivers to significantly breach the Cascades and Coast ranges, allow mixing of east-side and west-side species and genetic varieties.

Provincial setting: The Siskiyous, much older and more varied in climate and geology than either the Cascades or Coast Ranges, still provide a diversity of source material for the surrounding areas and act as a sink or refuge for species during climatic extremes. The ice ages and the xerothermic period are examples of these recent extremes. Today this area remains central to the continued health and development of the Pacific Northwest flora, like a busy intersection in the migratory crossroads.

Map 1. Southwest Oregon Late Successional Reserve Areas

II. Individual LSR Context

Table 1 lists the vegetative status of each Late-Successional Reserve. Late seral habitat is a "coarse filter" which indicates how well the reserve is functioning. For example, a reserve with 80-100% of the capable acres in late-successional conditions would likely function well. Conversely, less than 40% late-successional conditions would indicate a poorly functioning LSR. Of course, these ranges would vary over time and space.

Previous work documented in the Shasta Costa EIS suggests the functional range is between 45-70% late-successional conditions. Research in the future will provide better information.

Table 1: LSR Characteristics 1/ *UPDATE NOTE*: Column 6 has not been updated to reflect changes due to Biscuit Fire.

LSR	Size	Percent of Area with Potential (acres) 2/	Percent Late Successional (acres) 3/ Post Fire	Percent Managed Stands 4/	Interior Late-Successional Habitat (acres) 5/ Post-Biscuit Fire Changes Not Incorporated
Briggs	53,980	60% (32,223)	44% (14,307)	7%	32% (10,334)
East IV	62,809	93% (58,260)	48% (28,202)	35%	7% (4,120)
Williams	59,717	84% (50,333)	47% (23,766)	13%	12% (6,884)
Fish Hook	151,965	91% (137,877)	43% (59,503)	10%	15% (20,268)
Galice	82,895	94% (78,215)	60% (47,151)	13%	8% (6,791)
North Chetco	26,199	83% (23,426)	38% (8,886)	22%	5% (1,068)
Northwest Coast	145,974	86% (125,542)	56% (70,597)	25%	12% (15,469)
South Chetco	71,382	95% (67,750)	44% (30,028)	24%	8% (5,759)
Taylor	8,934	99% (8,810)	56% (4,912)	28%	15% (1,314)
West IV	53,738	6% (3,389)	60% (2,022)	1%	54% (1,817)
TOTAL	719,593	81% (585,825)	49% (289,444)		74,004

1/ All habitat data was calculated using PMR pixel databases for National Forest lands and existing vegetation GIS layer for BLM stands.

2/ Acres that have the potential to produce older forest conditions.

3/ Areas that have Late Successional characteristics include Mid, Late, or Climax seral stages with > 40% canopy closure - trees are at least 21 inch DBH (these are almost entirely natural stands). This is expressed as a percentage of the area capable of growing older forests. > 40% canopy closure was used as the "lower end" for late-successional habitat, instead of > 70%, because most natural stands between 40% and 70% are actually close to 60%, and therefore do qualify as late-successional habitat (eco-plot data for the Siskiyou shows old-growth at 60% or more canopy closure). Natural stands < 40% are typically on serpentine-influenced soils and do not qualify as late-successional.

4/ Managed stands are generally young plantations established after a regeneration harvest (such as a clear-cut). It also includes natural stands that have been commercially thinned.

5/ Areas calculated from PMR pixel data (25 by 25 meters) for National Forest lands, existing vegetation GIS layers for BLM lands. Interior habitat calculations used a buffer of 125 meters from the outside edge.

Regardless of percent of late seral habitat, other "fine filter" criteria (specific species requirements) also need assessment. For example, the abundance and distribution of specific habitat elements such as snags, down wood, etc. can be species specific.

Late-successional habitat, spotted owl habitat, old growth habitat, and older forests are not synonymous. This assessment focuses on appropriate habitat characterized by structure and elements associated with mature forests.

Additional characteristics and functions of each Late-Successional Reserve aid planning of activities within each LSR.

A. East IV/Williams-Deer

The East IV/Williams-Deer LSR has a combination of National Forest and BLM lands. The white fir, tanoak, and Douglas-fir plant series occupy most of this LSR. Thirty-six percent of the capable lands are in older forest conditions.

The east side of the Illinois River Valley, the high elevations, the low elevations in the BLM ownership, and similar geology are defining features of this LSR.

Existing Conditions: With a high percentage of the land in managed stands (35%), the proportion of interior late-successional habitat is only 7 percent. Most of the existing late-successional habitat is located in the white fir and tanoak plant series. Several large patches of late-successional habitat exist in the white fir, tanoak, Jeffrey pine, and Douglas-fir plant series. Some large interior patches of late-successional habitat exist in the white fir and tanoak plant series.

Species: The Applegate watershed (Cheney, Williams, and Powell Creeks), Sucker Creek, and Grayback Creek in the East IV LSR support important anadromous fish runs of Coho, Chinook, and steelhead.

Many rare animal species occur in this LSR. It presently supports 46 activity centers for the northern spotted owl: 10 of these activity centers have less than 15 percent of their home range in suitable owl habitat. It is accepted that 50% or more of the home range (within 0.5 miles) should be in older forest, to adequately support a viable owl pair. Less than 15 percent of the home range in older forest habitat will generally not support a viable pair of owls over the long term; 22 of these 42 activity centers contain greater than 50% of their home range in suitable owl habitat. The remaining 14 sites have 16-49% suitable habitat within their home range. Other animal detections include wolverine, fisher, marten, big-eared bat, and goshawk, along with many other plant and animal species.

In 1990-1992, BLM established a spotted owl density study in this LSR. The purpose of the Williams Density Study Area was to establish base line population information, habitat quality information, and population dynamics for spotted owls in this 119 square mile area. In 1992, scientists calculated a relatively high density of 0.159 owls/km^2 (Table 2).

Sites located within the LSR that contain less than 40% of suitable owl habitat appear to be declining. This suggests the 1992 population was higher than what can be supported by existing habitat. Since 1992, the BLM has continued to monitor the majority of the spotted owl sites (22 of the 24 active sites located in 1992). Seven of these sites did not have responses in 1995. Five of those 7 sites are deficit in suitable owl habitat.

Only 4 of the remaining 15 sites have enough suitable habitat within 1.3 miles to be considered viable over time. The ability of the remaining viable nesting pairs to contribute young to successfully repopulate vacated sites is not known. The uncertain future of the population is dependent upon avoiding future disturbances such as stand replacement fire, insects, and conversion of habitat by human activities.

Table 2: Crude Densities in S.W. Oregon Spotted Owl Density Studies (Owls/km^2)

Year	Butte Falls	Evans Creek	Elk Creek	Cow Creek	Williams
1992	0.084	0.104	0.245	0.106	0.159

Several diverse habitats persist in the LSR. Thirty-six meadows covering 1,338 acres grow in the area and 10 ponds are present. Some distinctive high elevation meadows provide plant diversity. Rock habitat and hardwood sites including important oak savannas also provide some important habitat diversity.

Surrounding Ownerships and Land Allocations: The ownership characteristics surrounding the East IV/Williams-Deer LSR are a mix of private and federal lands. On the northern, eastern, and western sides of the LSR, a checkerboard ownership pattern of Bureau of Land Management and private lands exist. The southern boundary of the LSR is a solid block of lands of the Rogue, Siskiyou, and Klamath National Forests. National Forest lands immediately south of the LSR include Wildernesses and the Applegate Adaptive Management Area land allocations. The BLM lands immediately to the west of the LSR are also in the Illinois Basin and allocated to matrix lands. The Applegate Adaptive Management Area covers BLM lands to the north and east of the LSR.

Private lands adjacent to the LSR include residential home sites, small woodlots, and lands managed for agricultural uses. The community of Williams is approximately two miles east of the LSR and the community of Murphy is about two miles north of the northeastern LSR boundary. The town of Takilma is west and north of the LSR and the community of Cave Junction is several miles to the north of Takilma.

Connections: Other characteristics and functions of this LSR are the high elevation older forest connections between the eastern Illinois Valley mountains and the coastal part of the Siskiyous. Most of this high elevation connection occurs in the white fir and red fir plant series. Parts of this LSR also connect the Rogue and Illinois River Valleys. Refer to Structural/Seral Stage Map and Existing Vegetation Map at the Siskiyou National Forest and Medford BLM for exact locations of these connections.

In addition, this LSR has an "elevator effect." It provides contiguous forest reserves from the lower elevations to the higher elevations. A good example is Grayback Creek, which leaves the LSR at an elevation of 1,800 feet, and has its headwaters at over 5,000 feet. This elevator effect provides opportunities for species to "move" up and down in elevation during long warming or cooling periods.

This LSR connects with scattered older forest habitat on BLM lands to the north and east (part of the Applegate AMA) and larger blocks of older forest habitat in the Siskiyou and Red Buttes Wildernesses to the south and east (on Klamath and Rogue River NFs, respectively). The connections to the LSRs on the Klamath National Forest and Six Rivers National Forest are important considerations. However, this LSR assessment does not include these LSRs due to budget and time constraints. During implementation, these connections need to be considered if relevant.

There is a lack of older forest connections directly to the east and west. Consequently, the area to the south provides functioning connections.

Land between the headwaters of the Illinois and Smith rivers south of O'Brien, Oregon connects private lands and federal ownerships within the Klamath, Siskiyou, and Six Rivers National Forests. U.S. Highway 199 south of O'Brien bisects this corridor, traversing the headwaters of the Illinois and Smith rivers. The highway is a permeation (Perry 1994) to this critical connection.

Geo-soils: In places, the potential of the land to grow older forests is limited by the serpentine geology. These serpentine lands also have their own late-successional conditions, but these conditions do not support many of the species normally associated with older forests (canopy closure of Forests on serpentine soils is usually less than 40%).

This serpentinite geology, ultra basic soils, and dry summer conditions lend this landscape an unusual tone and pleasant atmosphere. Low available soil moisture and low soil nutrients limit tree growth and provide smaller trees with less plant biomass than adjacent lands.

B. Briggs LSR

The Briggs LSR has all National Forest lands. The tanoak and Douglas-fir plant series occupy the majority of this LSR. Sixty percent of the LSR is capable of growing spotted owl habitat. Of these capable lands, 44 % are currently older forests (the highest percentage of any LSR).

Existing Conditions: With a low percentage of the land in managed stands (7%), the proportion of interior late-successional habitat is 32 percent (post-Biscuit Fire changes not incorporated). Most of the existing older forest habitat is located in the Douglas-fir, Jeffrey Pine, tanoak, and white-fir plant series. Several large patches of older forest habitat exist in the all four plant series. Some large interior patches of late successional habitat exist in the Douglas-fir and tanoak plant series.

Anadromous fish runs of Coho, Chinook, and steelhead use the Illinois River and several tributaries.

Many rare animal species occur in this LSR. It presently supports nine activity centers for the northern spotted owl. Two activity centers have less than 15% of their home range as suitable owl habitat; four activity centers have 16-49% suitable habitat within their home range; and three have greater than 50% of their home range in suitable owl habitat. Other animal detections of interest include goshawk, among many other plant and animal species.

Several diverse habitats persist in the LSR. Five meadows covering 49 acres grow in the area and 3 ponds are present. Some talus and bluff habitat and hardwood sites (including tanoak) also provide some important habitat diversity.

Surrounding Ownerships and Land Allocations: The ownership characteristics surrounding the Briggs LSR are a mix of National Forest lands. The Kalmiopsis Wilderness (180,000 acres) exists on the western sides of the LSR. The South Kalmiopsis roadless area and the West IV LSR are located on the southeastern boundary. The northern and eastern boundaries are matrix lands intersected by riparian reserves.

Connections: Important characteristics of this LSR are the Illinois River connection between the Illinois Valley and the Rogue River. In addition, the older forest habitat in the Briggs LSR connects to the Kalmiopsis Wilderness and to the Taylor Creek LSR.

Geo-soils: In places, the potential of the land to grow late-successional forests is limited by the serpentine geology, though not as limited as in the West IV LSR.

C. Fish Hook/Galice LSR

The Fish Hook/Galice LSR is a mixture of BLM and National Forest lands. The tanoak and Douglas-fir plant series occupy the majority of this LSR, with a major component of white fir. Forty-three percent of the capable lands are in older forest conditions.

Existing Conditions: With a low percentage of the land in managed stands (10%), the proportion of interior late-successional habitat is 15 percent (post-Biscuit Fire changes not incorporated). Most of the existing late-successional habitat is located in the Douglas-fir, tanoak, and white-fir plant series. Several large patches (total patches and interior patches) of late-successional habitat exist in the all three plant series.

Alaska yellow-cedar and a few associated uncommon plants occur in several high elevation north slope locations. Such plants are thought to be “refugia” species; they became isolated from large populations during the cool Pleistocene” geologic time period.

Several key watersheds (Big Windy, Howard, Rogue River, Mule Creek, Kelsey Creek, Whiskey Creek, Silver, Indigo, Shasta Costa, and Lawson) support valuable runs of Coho, Chinook, and steelhead anadromous fish.

The Fish Hook (NF)/Galice (BLM) LSR supports active elk herds, especially in the Fish Hook Peak Peavine Mountain areas. In cooperation with the Oregon Department of Fish and Wildlife, the BLM employs many different habitat and population management to enhance elk numbers in the Peavine area.

Many rare animal species occur in this LSR. It presently supports 58 activity centers for the northern spotted owl. One activity center has less than 15% of its home range as suitable owl habitat; 15 sites have 16-49% suitable habitat within their home range; and 42 of these 58 home ranges contain greater than 50% suitable owl habitat. BLM has excellent quality site-monitoring data available for this area. Other animal detections of interest include peregrine falcons, martens, Pacific western big-eared bats, and goshawks, among many other plant and animal species.

Several diverse habitats exist in the LSR, including the Fish Hook Wildlife Area. Fifty-nine meadows covering 2,335 acres grow in the area and 8 ponds are present. Eighty-eight different sites provide talus and bluff habitat, plus 15 hardwood sites, also provide important habitat diversity.

Surrounding Ownerships and Land Allocations: The eastern boundary is a checkerboard ownership pattern of BLM and privately owned lands. A solid block of federal ownership on the other three sides dominates the Fish Hook/Galice Block LSR.

The Wild and Scenic Rogue River corridor splits the northeastern portion of the LSR. This Congressional designation takes precedence over the LSR allocation. Consequently, the River corridor is not part of the LSR.

The Northwest Coast LSR borders this area to the west, the Kalmiopsis Wilderness to the south, and the Wild Rogue Wilderness to the northeast. Private lands adjacent to the eastern boundary of the LSR in the Galice Creek drainage include active mining claims. Private commercial forest lands, private residences, and Indian Mary Park (a Josephine County facility) are located to the east and southeast of this LSR.

Connections: This is the central LSR on the Siskiyou National Forest and consequently provides many connections. It provides a corridor of older forest habitat between the Kalmiopsis and Wild Rogue Wildernesses. It has a connection of existing older forest habitat through Lawson Creek and the Illinois River to the Northwest Coast LSR. Another connection is the Foster Creek drainage where older forest habitat connects to the Northwest Coast LSR. In addition, the areas not harvested in Silver, Shasta Costa, and Indigo watersheds provide unfragmented habitat. The east/west older forest link helps connect the coastal mountains east across the valley to the Rogue-Umpqua divide.

A patch of Matrix land exists in the middle of this LSR, near the Fish Hook peak. These matrix lands have been fragmented by past harvests and by natural meadows. Consequently, it was excluded from this LSR.

Climate: The climate differentiates this LSR from the Northwest LSR. It has little summer fog, compared to the cooler and moister NW Coast LSR.

D. West IV

National Forest lands dominate within the West IV LSR along with a small amount of BLM land. It has a large component of Jeffrey pine plant series and Douglas-fir/tanoak plant series. Only 6 percent of the LSR has the potential to grow large trees and older forests suitable for the northern spotted owl. Fifty-four percent of these capable lands are in late-successional conditions.

Existing Conditions: A low percentage of the land is in managed stands (1%). Consequently, the amount of interior late successional habitat is 29 percent (post-Biscuit Fire changes not incorporated). Most of the

existing older forest habitat is located in the Jeffrey pine and tanoak plant series. Several large patches of late-successional habitat and interior patches exist in the tanoak plant series.

This LSR has many sensitive plant species. Many of these species are associated with the serpentine habitat. For some sensitive plant species, their entire range is located almost entirely with this LSR. In addition, a high number of species (including sensitive and non-sensitive) occur only in this northwest California and southwest Oregon serpentine habitat.

The North Fork Smith key watershed supports valuable runs of sea-run cutthroat, Chinook, Coho, and steelhead anadromous fish.

Many rare animal species occur in this LSR. It presently supports two known activity centers for the northern spotted owl. Both of these centers have between 16 and 49 percent of its home range in suitable owl habitat.

Several diverse habitats persist in the LSR. Only 1 meadow covering 6 acres is in this LSR and no ponds are known. Rock habitat sites provide some important habitat diversity. Darlingtonia bogs are common in this LSR, compared to the other LSRs.

Surrounding Ownerships and Land Allocations: The Kalmiopsis Wilderness and the Briggs LSR border to the north and west. To the east are matrix federal lands and a botanical area. To the south is the Six Rivers National Forest.

The northern segment of the West IV LSR is disjointed from the southern portion and shares a common boundary with the Briggs LSR. This northern segment is still classed as part of the West IV LSR due to the serpentine geology and associated plant communities, also found in the southern portion. The South Kalmiopsis Administrative Study Area splits this LSR, but acts as a connection between the northern and southern segments, and contains similar geology and landscape patterns.

Connections: This LSR connects Briggs, South Chetco and East IV LSRs. It connects an administrative study area in the Siskiyou National Forest, the North Fork Smith Recreation area to the south (Six Rivers National Forest), and the Kalmiopsis Wilderness to the north. Important areas for older forest connections are the Illinois River corridor and the BLM lands which connect to the Sucker-Grayback drainage. Only limited connections of older forests are available to the east, west, and south due to private land, geology, and past management practices.

Geo-soils: Serpentinite and peridotite rocks (ultra-basic soils), and low summer rainfall define the landscape character. Other contributors to the wide-open space of the "serpentine" landscape include numerous uncommon and endemic plants, a 25-year wildland fire return-frequency and rugged mountains. Diorite rock and the associated soils of the upper Baldface Creek area support a diverse plant community with old-growth Port-Orford-cedar, western hemlock, and Douglas-fir. Such plants, including the hemlock, are thought to be refugia species isolated from larger populations during the cool Pleistocene.

E. South Chetco

The South Chetco LSR is located west of the Smith River and West IV LSR. Thirty-six percent of the capable lands are older forests. Most of the area is National Forest. A small amount of BLM land (Coos Bay District) exists between the National Forest and the Pacific Ocean.

Existing Conditions: With a moderate percentage of the land in managed stands (24%) and interspersed tanoak stands, the amount of interior late-successional habitat is 8 percent (post-Biscuit Fire changes not incorporated). Most of the existing older forest habitat is located in the TSHE and LIDE3 with several large patches of late-successional habitat. Some large interior patches of late-successional habitat exist in the LIDE3 plant series. Stands of tanoak dominate much of this LSR.

This LSR supports the northern most population of coastal redwood, and many productive streams of anadromous fish. Being close to the ocean, many streams such as Emily Creek, the Chetco River, the Winchuck River, and Wheeler Creek provide easy access for sea going birds and fish. The Winchuck and Emily are designated key watersheds for anadromous fish (Chinook, steelhead, and Coho).

People have detected many rare animal species in this LSR. Occupied behaviors by marbled murrelets have been detected on 20 occasions in this LSR; presence has been detected on an additional 52 occasions. The LSR presently supports 29 activity centers for the northern spotted owl. For one of the 29 northern spotted owl activity centers, less than 15 percent of their home range is suitable owl habitat; 15 have 16-49% in suitable habitat; and 13 of these 29 home ranges encompass more than 50 percent suitable owl habitat. Other animal detections include fisher, marten, and goshawks, along with many other plant and animal species.

Several diverse habitats persist in the LSR. Ten meadows covering 113 acres are in the area and no ponds are present. Talus, bluffs, and hardwood sites including important tanoak stands also provide some important habitat diversity.

Surrounding Ownerships: The Kalmiopsis Wilderness is directly east of this LSR. To the south lies the Six Rivers National Forest with the Smith River Recreation Area. Forest Service Matrix lands are located along the northern boundary while private ownership abuts the western boundary. A small Coos Bay BLM parcel to the west outside the Siskiyou National Forest boundary is also part of this LSR

Connections: The areas of older forest habitat connect to other areas along the rivers. The north slopes along these streams support large trees and form stringers to connect older forests. For example, the Wild and Scenic Chetco River has older forest habitat that links this LSR to the Kalmiopsis Wilderness. In addition, older forest connections also link this LSR to the Six Rivers National Forest to the south.

F. North Chetco

The North Chetco LSR (all National Forest land) is a continuation of the South Chetco LSR, with many similar coastal elements (salmonids, murrelets, etc.). The hardwood component is not as dominant, although the tanoak plant series covers much of this LSR. Thirty-eight percent of the capable lands are in older forests (a low percentage compared to the other LSRs).

Existing Conditions: With a moderate percentage of the land in managed stands (22%), the amount of interior late-successional habitat is the lowest of any LSR (5%) (post-Biscuit Fire changes not incorporated). The fragmentation by harvest units and past fires has probably reduced the amount of interior habitat. Most of the existing older forest habitat, large patches, and amount of interior habitat are in the tanoak plant series.

The Chetco Wild and Scenic River supports large runs of anadromous fish, including Chinook, steelhead, and Coho. However, no key watersheds are designated within this LSR.

Detected animal species in the LSR include nine activity centers for the northern spotted owl. Seven of these owl home ranges have 16-49% suitable habitat within their home range and two activity centers have greater than 50% suitable owl habitat. Occupied behaviors by marbled murrelet have been detected on four occasions in this LSR; presence has been detected on an additional 14 occasions. Other animal detections include American marten and goshawk, along with many other plant and animal species.

Several diverse habitats persist in the LSR. 18 meadows covering 438 acres are located in the area and three ponds are present. Two botanical sites, one talus bluff, and many hardwood sites provide some important habitat diversity.

Surrounding Ownerships and Land Allocations: The Kalmiopsis Wilderness is the eastern boundary of this LSR. National Forest Matrix lands and Riparian Reserves are the northern and southern boundaries.

The western boundary is a combination of private lands, matrix lands, and riparian reserves. This LSR surrounds part of the Wild and Scenic Chetco River.

Connections: North-facing slopes close to the riparian areas contain extremely large trees. These older forest areas connect to the Fish Hook/Galice LSR through the riparian zones of Lawson Creek downstream to the Illinois River.

Geo-soils: The land is deeply dissected, primarily due to heavy precipitation and recent tectonic activity. Soils are deep and fertile, associated with the metasedimentary rocks of the area.

G. Northwest Coast LSR

The majority of the large Northwest Coast LSR is within the tanoak and hemlock plant series. Fifty-six percent of the capable lands are in older forests. Most of the area is National Forest land except for small BLM areas on the west, north, and northeast borders.

Existing Conditions: Twenty-five percent of the land area is in managed stands and the proportion of interior late successional habitat is 12%. Most of the existing older forests are located in the western hemlock and tanoak plant series. Several large patches of late-successional habitat are found in these two series.

Several key watersheds (Elk River, South Fork Coquille, and Quosatana) support valuable runs of sea-run cutthroat, Coho, Chinook, and steelhead.

Many rare animal species occur in this LSR. It presently supports 45 known activity centers for the northern spotted owl. One of these home ranges contain less than 15% suitable owl habitat; 17 activity centers contain 16-49% suitable habitat; and 27 of the 45 home ranges contain more than 50% suitable owl habitat. Occupied behavior by marbled murrelets has been detected on 70 occasions in this LSR; presence has been detected on an additional 150 occasions. The boundary between the Northwest Coast and Fish Hook/Galice LSRs defines the known inland extent for the range of the marbled murrelet. Other animal detections include fisher, great gray owl, marten, and goshawk, along with many other plant and animal species.

Several diverse habitats persist in the LSR. Fifty meadows covering 2,138 acres grow in the area and 11 ponds are present. Seven swamps, many talus/bluff habitats, and hardwood sites including important oak savannas along the Rogue River near Agness, also provide important habitat diversity.

Surrounding Ownerships and Land Allocations: The Northwest Coast LSR borders private lands on the west and north. The Grassy Knob and Wild Rogue Wildernesses are adjacent. In addition, some National Forest Matrix lands are inclusions. The Fishhook/Galice LSR lies to the south. The village of Agness and some surrounding private lands lie in the middle of the LSR.

Connections: This coastal LSR is large (146,000 acres), with many linkages of older forest habitat. A large older forest links the Rogue River/Agness area to Agness Pass via the late-successional habitat in Foster Creek. A relatively large area of older forest habitat exists in the Elk River drainage, including the Grassy Knob Wilderness. The older vegetation along the Coquille River corridor links with Agness Pass and Elk River. Hall Creek in the Coquille drainage supports a relatively large unfragmented block of habitat with numerous Port-Orford-cedar stands containing many large trees, murrelets, and spotted owls. The boundary between Fish Hook LSR and the Northwest Coast LSR, and the North/South Chetco LSRs and the Kalmiopsis Wilderness is a 3,000' or greater ridge. Protocol surveys have not detected murrelets inland from this ridge (except for three sightings just east of the line). The summer fog and western hemlock plant series also do not cross the ridge.

Climate: The Northwest Coast LSR has a different climate than the Fishhook LSR. It has more fog and consequently more areas with the hemlock plant series. The tanoak plant series is also abundant, especially on the southern aspects.

H. Taylor LSR

The Taylor Creek LSR is a small area, mainly designated for its critical anadromous fish habitat and stair step (low elevation to high elevation) characteristics. Douglas-fir plant series is the major ecological classification. Fifty-six percent of the capable lands are in older forests (the highest of all LSRs). This LSR is completely on National Forest lands.

Existing Conditions: A high percentage of the land is in managed stands (28%) and the proportion of interior late-successional habitat is only 15 percent. The existing older forest habitat is all located in the Douglas-fir plant series. Several large patches of late-successional habitat and interior habitat exist.

This LSR supports a large canyon live oak plant community along the canyon walls in Taylor Creek.

Taylor Creek is a key watershed due to its highly valued steelhead, Coho, and Chinook anadromous fish.

Rare animal species occur in this LSR. It presently supports three known activity centers for the northern spotted owl. One home range contains more than 50% suitable owl habitat; the others contain between 16% and 49% suitable owl habitat. Other animal detections include goshawk.

Several diverse habitats persist in the LSR. Two meadows covering 117 acres are present in the area. No ponds are known. Talus slopes and rocky bluffs also provide important habitat diversity.

Surrounding Ownerships and Land Allocations: Taylor Creek LSR is surrounded on three sides by National Forest Matrix land. The other, or downstream side consists of BLM Matrix and Riparian reserves, and some privately owned lands.

Connections: Stringers of older forest habitat in the northeast and west link BLM lands to the Fish Hook/Galice LSR. Habitat corridors along riparian reserves also connect Taylor LSR to the southwest.

III. The Vegetation: Plant Series, Patch Sizes, and Amounts

A. Plant Series

Plant series is a major stratification in this document. As an expression of site potential, series provide the basis to determine if the desired future is possible to achieve. Series are named after the dominant climax plant species (sometimes co-dominants are named). For example, the hemlock plant series will grow to be dominated by large hemlock if undisturbed by fire, floods, slides etc. Moreover, each series is characterized by a distinct disturbance regime (Table 12) and its associated "patch dynamics" (Figures 4-7). Series also provides information on the risk of maintaining specific structures or species composition (see the discussion on the application of fire).

Forests of the Klamath Province are comprised of at last 16 series. The most common are the White-fir, Red-fir, Port-Orford-cedar, Tanoak, Jeffery Pine, Douglas-fir, Western Hemlock, and Mountain Hemlock (Atzet and Wheeler 1984: Sawyer and Thornburgh 1977).

The network of LSRs in Southwest Oregon includes mapped areas of the following plant series (Maps 2, 2a, and 2b): White Fir (about 35% of the area), Shasta Red Fir, Port-Orford-cedar, Tanoak, Douglas-fir (about 25% of the area), Jeffrey Pine, Ponderosa Pine, Western Hemlock, Tanoak - Douglas-fir, Douglas-fir - Tanoak, Western Hemlock - Tanoak, and Tanoak - Douglas-fir - Jeffrey pine. Series with tanoak in the name include about 15% of the total area.

White fir is the most environmentally variable series. The Douglas-fir series occurs at lower elevations than the white fir series on shallow soils. The tanoak series dominates warm, wet coastal sites and inland areas with deep soils and low evapo-transpirational demand (Atzet et al. 1983). The Shasta red fir series tends to occur on warmer, high elevation, south facing basaltic sites. Port-Orford-cedar is confined to drainages in the southern part of the forest and is scattered more liberally in the north. The Jeffery pine series is confined to ultrabasic soils, which occur throughout the Province. The western hemlock series is very productive and occurs in moist temperate environments at low elevations near the coast. Mountain hemlock occurs at high elevations, sometimes delimiting timberline, where soil and air temperatures are extremely cold (Atzet et al. 1984; Sawyer and Thornburgh 1977a).

The white fir series: The white fir series occurs on a wide range of elevations, but is centered slightly above the average elevation of the Province. It occurs on all aspects, and is rare on ultrabasic serpentinite and peridotite parent rock. Granitic rocks on south aspects accompany the drier plant associations of the series. Douglas-fir trees usually dominate white fir stands in the overstory until late in succession. Thus, litter production is high, biomass production is high, and fuels dry quickly.

Fire is the dominant agent of disturbance to the white fir series, followed by humans, wind, and disease. It is the only series in which insects were observed to be the last major disturbance, albeit a small percentage of the sampled stands. Wind disturbance has a moderate influence in the series.

The red fir series: The red fir series occurs at high elevations in a narrow band between the mountain hemlock series and the white fir series. It is often on wind-prone topography, but usually on deep fertile soils. It has a slight tendency to occur on warmer, drier south aspects, and biomass production can be high.

Fire is most frequently the last major disturbance to the red fir series, followed by humans, wind, disease, and ice and snow. The effects of wind are among the highest for the series, and ice and snow are second only to the mountain hemlock series, which occurs at the higher elevations. Stands are relatively young. The mean disturbance interval of 40 years is moderate for the province.

The Port-Orford-cedar series: The Port-Orford-cedar series occurs at mid to low elevations and tends to follow drainages, especially in the southern half of the province. It is normally the most productive series. However, in many stands, ultrabasic soils lower productivity and are associated with the common serpentine flora.

Fire is most frequently the last major disturbance to the series. Fire, humans, and disease were the only agents observed. Port-Orford-cedar root disease influences stands along roads and streams by killing some Port-Orford-cedar trees. The series, associated with riparian environments, has a mean interval between disturbances of 150 years. The time since the last disturbance (usually fire, occasionally disease) is the longest (129 years) of any plant series.

The tanoak series: The tanoak series has the lowest average elevation in the province. It generally occurs below 4000 ft. and west of the coastal crest where the marine influence is high. Tanoak is an indicator of deep fertile soils or low atmospheric moisture demand.

Fires and humans are the most important disturbance agents; wind, disease, and erosion are minor in comparison. Ladder fuels build quickly, and a high proportion (>25%) of the area burned may be high intensity stand replacement fire. The series has the highest occurrence of fire as the last major disturbance, but is moderate among the series in disturbance characteristics. The mean interval between disturbances is estimated to be 90 years.

The Jeffery pine series: The Jeffery pine series grows only on ultrabasic soils within the province, but occurs on a wide range of elevations. It is characterized by low biomass production, low stand densities and an unusual complement of rare or endemic plant species. It often occurs on south aspects with soil depths usually less than 20". Grass build-up is common.

Although fire occurrence is high, human disturbance is low. Since stands are sparse and low in biomass production, they are rarely harvested. Wind is a more important agent than humans. Stands are open and trees are shallow-rooted, a good combination for windthrow. The series is also notable for showing the least degree of disturbance, regardless of agent.

The Douglas-fir series: The Douglas-fir series occurs on a wide range of elevations and occurs slightly more often on south aspects than north. Stands occur on warmer, drier sites with moderately shallow soils, but biomass and litter productions are high. Open canopies allow tree regeneration and shrubs to form fuel ladders.

The mean interval between fires (30 years) is short: only that of white fir series is shorter. Controlling fire has increased the mean interval. The average stand in the series has been undisturbed for 76 years, over twice the mean return interval. Continued fire suppression may cause "unnatural" build up of fuels, resulting in a greater proportion of high-intensity fire when the area finally burns.

The western hemlock series: The western hemlock series generally grows on lower elevations and northerly aspects at higher elevations. It is not associated with any specific parent rock and is highly productive. Self-pruning and mortality rates are low even through mid-seral stages and older forests. Litter accumulation is low until late successional stages.

The series has the highest occurrence of human disturbance, although fire is still the most frequently observed event. Wind is a frequent disturbance agent. The series is close to the coast, where cyclonic winter winds are common when soils are saturated. Western hemlock also has shallow roots, making it susceptible to windthrow. The average fire interval is estimated at 65 years.

The mountain hemlock series: The mountain hemlock series occurs at high elevations. It is similar to the western hemlock series with respect to litter production, but biomass production is low. It has a tendency to occur on cold, northerly aspects. On southerly aspects, it is often replaced by the red fir series.

Fire occurrence is lowest for all the series. Sites are cold, flat, and moistened from summer thunderstorms. Ice and snow are major disturbance factors; over 20% of the stands were damaged by ice or snow as the last major disturbance event. Disease, especially root disease, is common in older mountain hemlock stands and in some areas controls stand dynamics. The mean disturbance interval is the longest (115 yr) for all the series.

Summary: The four major plant series that cover the most area in the LSRs are white fir (ABCO), tanoak (LIDE3), Douglas-fir (PSME), and western hemlock (TSHE) (Figure 1). The East IV/Williams LSR is unique due to the large area of white fir plant series. Taylor LSR has only the Douglas-fir plant series. The western hemlock plant series covers the largest area of the Northwest LSR. All the other LSRs have tanoak plant series as the largest component. Finer details about plant series are found in the appendices.

Map 2. Southwest Oregon Draft Plant Series

Map 2a. Draft Plant Series - Galice LSR

Map 2b. Draft Plant Series - Williams LSR

B. Amount of Older Forest Habitat

The percentage of capable and older forest habitat varies by LSR (Figures 2 and 3). Total area of late-successional habitat was evaluated by plant series for the LSRs (Appendix A). Estimates vary as to the amount of older habitat needed, but a range of 45-75% has been estimated for Southwestern Oregon (REAP 1993) and 40-70% for the Shasta Costa analysis. These estimates, however, are for the total landscape, not LSRs per se. LSRs, in combination with other land allocations with no programmed harvest, are expected to contain the majority of late-successional habitat. Older forest habitat is needed to maintain a well functioning late-successional ecosystem on federal lands in the assessment area. None of the LSRs are presently within the estimated range. Although the focus of LSRs is older forest habitat, other habitat conditions within these land allocations are also important to sustaining ecosystem health.

When the data for spotted owl activity centers and late-successional habitat is examined, a strong relationship between the number of centers and the total available habitat appears to exist (Figures 3 and 4). This indicates the importance of sustaining late-successional forest conditions for these species.

Many authors emphasize the importance of large patches of habitat for the viability of species (Harris 1984; Hunter 1990; Perry 1994; Noss 1995). A solid relationship between interior older forest habitat and known spotted owl activity centers is not apparent. The presence of adjacent tanoak and other hardwood stands may account for this weak relationship. In addition, the analysis of patch size by plant series may obscure larger patches located in adjacent plant series.

Figure 1: Plant Series by LSR

Figure 2: Percent Area Capable of Growing Older Forests

Figure 3: Total and Interior Late-Successional Habitat

Figure 4: Owl Activity Centers as a Function of Late-Successional Habitat

Figure 5: Older Forest Patch Size - TSHE Plant Series

Figure 6: Older Forest Patch Size - ABCO Plant Series

Figure 7: Older Forest Patch Size - LIDE3 Plant Series

Figure 8: Older Forest Patch Size - PSME Plant Series

C. Patch Sizes

UPDATE NOTE: New information on patch size, as related to habitat for the northern spotted owl, has been discussed in this section. However, this section has not been reviewed by a Forest Ecologist.

Existing patch sizes for the older forests in each LSR (Figures 5-8) generally average less than 200 acres. This figure includes the stratification of each LSR by plant series. Consequently, this estimate underestimates the average patch size where a patch of older forest covers more than one plant series.

Minimum patch sizes for northern spotted owls have not been described; however, studies consistently find more older forest near spotted owl nest sites than found randomly on the landscape (Carey et al. 1997, Hunter 1994, Ripple 1997, Perkins 2000, Franklin and Gutierrez 2002). Many studies have attempted to describe thresholds for fragmentation or patch size where spotted owls are less likely to survive. However, "before habitat fragmentation can be assessed and understood, habitat must be properly defined" (Franklin and Gutierrez 2002). Nevertheless, spotted owls are generally found in larger patches of older forest, and a review of studies indicates a reasonable patch size for conserving nest cores should be about 200 acres.

Existing patch sizes contained in the Silver fire area (the geographical center of the Siskiyou National Forest) are an example of how recent natural processes (fire) interact with the older forest patch sizes. The Silver fire covered approximately 100,000 acres in 1987. Ignited by lightning, this fire area represents a natural disturbance pattern. The fire frequency in this area had not been altered significantly by previous fire suppression (fire frequency of approximately 50 years).

Silver fire may not be an appropriate model for all areas but it is a good first approximation. Other possible sources of data are the historic timber type map (Siskiyou National Forest GIS files) and working backwards from existing vegetation.

As illustrated in figures five through eight, the patch size distribution in Silver is not statistically different than the distributions in each LSR. These data suggest management of the LSRs has not fragmented the older forest habitat beyond the extremes of a natural disturbance (Silver fire). However, patch size distribution is extremely variable (has a high standard deviation).

Several LSRs do have a smaller average patch size than Silver, indicating a potential need to grow larger patches of older forest, particularly when interior patch sizes are considered. In particular, these LSRs are: North Chetco, South Chetco, and West IV for the PSME plant series; West IV for the ABCO plant series; Northwest Coast and Galice LSR for the LIDE3 plant series; and the Northwest Coast and Galice LSRs for the TSHE plant series. In addition, larger patch sizes are lacking in several LSRs. In particular, the LIDE3 plant series in the Williams, West IV, Galice, South Chetco, and Northwest Coast LSRs are lacking larger patch sizes that are found in the Silver complex. The existing interior older forest patches in each LSR are small in number and important as habitat due to their limited extent. Their locations are in maps 3, 3a, and 3b.

Map 3. Southwest Oregon Interior Patch Areas

Map 3a. Interior Patch Areas - Galice LSR

Map 3b. Interior Patch Areas - Williams LSR

Map 3c. Southwest Oregon Botanical Areas, Botanical Sites and RNA's

Map 3d. RNAs and ACECs – Galice LSR

Map 3e. RNAs and ACECs – Williams LSR

IV. Species With Special Status and Unique Habitats (Fine Filters)

Standards and Guidelines concerning important plants and wildlife, including components of their habitats, are identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (Attachment C of the NWFP ROD).

ROD Standards and Guidelines important to maintenance of species viability and ecosystem health address various topics:

> Late successional habitat in upland and riparian areas; large dead woody material (both standing and down) in all successional conditions; large green trees in all successional conditions; soil and litter; and unique habitats such as caves, mines, abandoned buildings and wooden bridges, also in all successional conditions.

Habitat components identified in the Siskiyou National Forest Land and Resource Management Plan (USDA FS 1989) as important for maintenance of species viability and biological diversity are:

> Habitat corridors along major rivers; old growth forests; mature forests; early successional forests; special and unique habitats, i.e., meadows, swamps/springs/wet sites/ and lakes/ponds, tanoak and hardwood sites, elk travel corridors and calving areas, band-tailed pigeon sites, raptor nest sites, rock sites (cliffs, caves, talus), and botanical sites; and wildlife trees for snags.

Three important topics synthesized from the paragraphs above are discussed in this section. Plant and Wildlife/Fish species with special status are summarized, as well as unique habitats/components.

A. Plant Species with Special Status (and Habitat)

Maintaining habitats for rare plants is important for overall biological diversity on federal lands in southwest Oregon and NW California. Most of the rare plants that occur in LSRs are not late-successional forest species. Historically, wildland fires have been the major ecological process that have created varied habitats; in many areas fire can be an important tool for providing these habitats in the future. Monitoring will be critical to determining specific effects on individual rare species.

Known populations of rare plant species occur in each LSR and are shown in Table 3. Within the Siskiyou NF, some have a high proportion within LSRs or other land allocations with no scheduled timber harvest. These rare species include FS R6 Sensitive Species, BLM Sensitive and BLM Assessment species, ONHP and CNPS List 1 and 2 Species (Oregon Natural Heritage Program and California Native Plant Society), and additional selected taxa that are locally rare or have very restricted ranges.

Designated Botanical Areas, Botanical Sites (smaller sites with outstanding botanical values) or Research Natural Areas exist in each LSR as shown in Table 4. Also see Map 3c.

Late-successional rare plant species within LSRs, whose habitat is likely to be maintained and improved under LSR guidelines

Cypripedium fasciculatum and *Cypripedium montanum* (clustered lady slipper and mountain ladyslipper orchids) typically grow in late successional conifer forest. They are most commonly found in areas with multiple canopy layers, some light gaps, and rich herbaceous, shrub, and understory layers. They are less often found under a dense closed canopy. Individual plants will need to be protected from disturbance and fire where LSR activities are planned. However, the long term habitat quality for these orchids is expected to increase in many LSRs.

Early-successional species within LSRs, in habitats that would become forested and unsuitable without fire or other disturbance

These species are expected to disappear from LSRs unless measures are taken to maintain their early-successional habitat:

Arctostaphylos hispidula. Occurs on open and sunny sites, often on poor, rocky or shallow soils or brushfields where forest development is hindered by site conditions, mostly on the west side. Can't tolerate overstory tree competition. It is not a stump-sprouter, so it apparently regenerates from seed after fire.

Astragalus umbraticus. Found in open woods, transition zones, often in disturbed sites. Thought to be declining because of fire suppression. Fairly common in parts of Douglas County and Northeastern Josephine County, but not common on Siskiyou National Forest.

Haplopappus arborescens (Ericameria arborescens). Although this species has a wide range in California, only 3 populations are known in Oregon and those do not appear to be reproducing. In Oregon, this species is found in chaparral, chaparral edge, and brushy clearcuts, at elevations of 1,200 to 2,650 feet. One of the three Oregon populations is within a LSR (South Coast). The Draft Species Management Guide (Zika 1993) recommends prescribed burning be considered as part of a study of the species reproductive biology.

Iliamna latibracteata. Occurs in Fishhook, Northwest Coast, and East IV LSRs. Most often found in open areas after clearcuttting and burning. New habitat was created and existing habitat was improved by the Biscuit fire.

Lupinus tracyi. Seven of the eight known Oregon populations are within LSRs on the Siskiyou NF; in addition, there are 16 known California populations. In the Draft Species Management Guide (Kagan 1990), fire suppression and related succession is listed as the most serious threat for the Oregon populations. In areas of stable, forest habitat, the plants persist as isolated individuals in small habitat pockets and produced very few flowers and fruit. However, in the disturbed roadside and salvage-logged areas, density of plants is higher and almost all individuals flowered and produced higher numbers of flowers. Without disturbance, forest and shrub habitat on rocky ridges will slowly close in. All the Oregon occurrences were within the Biscuit fire area. It is not known how this species responds to fire but it is hoped that the fire was a big boost to these occurrences. Other *Lupinus* species are known to respond favorably. Preliminary reports of a couple populations are that they survived the fire.

Sophora leachiana. The entire range is the Taylor, Briggs and Galice Creek drainages between the Rogue River and the Illinois River, in an area about 20 miles by 6 miles, occurring in openings of mixed conifer forest at low elevation. The openings include natural habitat, such as river terraces, open ridges, open rocky slopes, or meadow edges, and created openings such as roadsides and bare soil within clearcuts. *Sophora* acts as a primary colonizer, is dependent on disturbances to create the open sites, and possibly fire for seed scarification. The combination of having large seed, indehiscent pods, and limited seed production is extremely unusual for a pioneer species. When the tree canopy becomes re-established, *Sophora* may persist vegetatively as rhizomes and aerial shoots, but it ceases to flower. Mature fruit has been rarely been found anywhere; the sites where seed has been observed are areas disturbed between 3-5 years prior (Crowder 1978, Kagan 1991).

Wildland fire suppression is listed as one of three main factors impacting *Sophora* populations in the Draft Species Management Guide. "Selected populations" should be managed with prescribed fire to maintain the required open habitat. Likewise, prescribed fire or manual clearing is suggested for populations that are found to be declining within specific population areas (Kagan 1991). Two of three selected populations are within the Briggs and Taylor Creek LSRs and five "temporarily selected populations" are also within these two LSRs.

Mid-successional, ecotonal, or special habitat species that may occasionally need habitat improvement activities to maintain their presence in LSRs

This group of rare plants occurs in a diverse range of habitats that could decline as forests grow, close overhead, and gradually encroach on ecotones and special habitats. Management activities on their behalf

would occasionally be necessary to maintain viable populations unless wildland fires occur often enough to maintain their habitat:

Bensoniella oregana, Delphinium nudicaule, Erythronium howellii, Eucephalus vialis, Frasera umpquaensis, Leucothoe davisii, Lilium kelloggii, Pedicularis howellii, Sidalcea malvaeflora ssp. patula, Trillium angustipetalum, triteleia henderonii var leachiae.

Serpentine rare plant species in LSRs

More than a third of the rare species occur in relation to unique serpentinite geology (21 species out of the 57 listed). The West IV LSR has the largest percentage of serpentinite, and contains habitat for many Klamath Mtns. endemics, including a number of species whose entire range is within the Josephine ultramafic sheet of the Illinois Valley (*Hastingsia bracteosa, Hastingsia atropurpurea, Senecio hesperius, Microseris howellii, Calochortus howellii*) or whose range is almost entirely within the LSR (*Epilobium oreganum* and *Viola primulifolia* var. *occidentalis*). Late-successional Jeffrey pine forests are often open enough to let in considerable sunlight. Hence some of the rare serpentine plants will tolerate this kind of habitat. *Erythronium howellii* is perhaps the only one that is dependent to some degree on forests or shade. Most of the rare serpentine species prefer habitats with more sunlight. Some seem to benefit from fire or other periodic disturbance. A Conservation Agreement, under discussion for almost a decade, is currently being developed between the U.S.D.I. Fish and Wildlife Service, Forest Service, Bureau of Land Management, State of Oregon, and The Nature Conservancy for federal candidate species associated with serpentine bogs and wetlands (*Hastingsia bracteosa, Hastingsia atropurpurea, Gentian setigera, Epilobium oreganum* and *Viola primulifolia* var. *occidentalis*). In addition, other important Oregon rarities and regional endemic species will be covered. These unique bog habitats should be considered for botanical sites designation (Forest Plan MA 9's) with future Forest Plan Amendments. Protection or enhancement of the water source is an important management consideration.

Other non-serpentine rare plants, largely unaffected by LSR guidelines or the development of late-successional forest

Roughly 16 of the 57 species in Table 3 are found on non-serpentine rock outcrops or in wetlands. These habitats won't generally support a dense forest canopy so management activities designed to enhance late-successional forest character in LSRs will not affect these species. The only known Oregon occurrence of the moss *Encalypta brevicolla* ssp. *crumiana* (in Fishhook LSR) is tentatively placed in this category. Information indicates it's a forested site but the key habitat feature is a protected rock crevice. Fire suppression activity or the construction of Fuel Management Zones could inadvertently destroy this occurrence or change the microsite habitat characteristics.

Plants Listed Under the Federal Endangered Species Act

Arabis macdonaldiana (Macdonald's rockcress): This serpentine-loving rockcress occurs in Mendocino, Siskiyou and Del Norte Counties in California and Curry County, Oregon. The majority of the world's known occurrences of *Arabis Macdonaldiana* are in the North Fork Smith River Drainage on Gasquet Ranger District of Six Rivers National Forest. One confirmed population of this rockcress is present in West IV LSR and one population is present in the South Chetco LSR. Some additional populations in Josephine and Siskiyou County portions of West IV and East IV LSRs are intermediate between *Arabis macdonaldiana* and the more common *Arabis aculeolata*. Generally this rockcress grows where it is rocky and open, on sites that could not support a forest. However, it sometimes occurs in areas that could eventually become shaded by brush, or a partial canopy of Jeffrey Pine, knobcone pine, or western white pine. So it is possible that management activities could someday be proposed at Macdonald's rockcress sites to combat encroaching brush or trees.

Fritillaria gentneri (Gentner's fritillary): This relative of the common scarlet fritillary (*Fritillaria recurva*) is not known to occur in any of these LSRs but there is some chance it could someday be discovered in the Taylor or Galice LSR areas. White oak woodland and other foothill habitats can host this plant. If found in

these LSRs, some management activities to prevent the development of late-successional forest in population areas would most likely eventually be needed.

Lomatium cookii (Cook's lomatium): This rare biscuit-root is known from the Agate Desert in the Rogue River Valley and in the Illinois Valley south of Cave Junction, on BLM and private lands in the Takilma-O'brien vicinity. Habitats are low vernally moist areas and some rolling savannahs on heavier soils, low elevations, serpentine or non-serpentine. There is a remote chance it could be found someday in the West IV LSR. If so, it is possible that management activities to prevent the development of late-successional forest in population areas could be needed.

Table 3 - Rare Plants Known within the LSRs

Rare Plant Species	South Chetco	North Chetco	North-west Coast	Fish Hook/ Galice (FS/BLM)	Taylor	Briggs	West IV	East IV/ Williams (FS/BLM)
Adiantum jordanii				X				
Allium campanulatum								X
Arabis aculeolata (CALIF)								X
Arabis macdonaldiana	X						X	
Arabis modesta				X	X			
Arctostaphylos hispidula	X	X	X	X			X	
Astragalus umbraticus					X			
Bensoniella oregana		X	X	X				
Calochortus howellii							X	
Cardamine nuttallii var. gemmata	X					X	X	
Carex gigas	X	X					X	
Carex livida							X	
Cypripedium fasiculatum				X	X	X		
Cypripedium montanum								X
Delphinium nudicaule								X
Dicentra Formosa var. oregana (CALIF)								X
Draba howellii						X		
Encalypta brevicolla ssp. crumiana (a moss)				X				
Epilobium oreganum							X	
Ericameria arborescens	X							
Erigeron cervinus		X		X		X		
Eriogonum diclinum								X
Eriogonum lobbii				X				
Erythronium howellii								X
Eucephalus vialis (Aster vialis)								X
Frasera umpquaensis				X				
Fritillaria glauca				X		X	X	
Gentiana setigera	X						X	
Gentiana plurisetosa								X
Hastingsia bracteosa and H. atropurpurea							X	
Hazardia whitneyi var. discoideus				X				X
Iliamna latibracteata			X	X				X
Kalmiopsis leachiana				X				
Leucothoe davisii				X				
Lewisia cotyledon var. purdyi						X		
Lewisia leana						X		X
Lewisia oppositifolia (CALIF)								X
Lilium kelloggii	X							
Lomatium engelmannii						X		
Lupinus tracyi						X	X	
Microseris howellii						X	X	
Monardella purpurea	X					X	X	
Pedicularis howellii								X
Perideridia erythrorhiza							X	
Salix delnortensis		X	X			X	X	
Saussurea americana								X
Saxifragopsis fragarioides				X				
Scirpus pendulus							X	

Table 3 - Rare Plants Known within the LSRs								
Rare Plant Species	South Chetco	North Chetco	North-west Coast	Fish Hook/ Galice (FS/BLM)	Taylor	Briggs	West IV	East IV/ Williams (FS/BLM)
Scirpus subterminalis						X		X
Sedum moranii					X			
Senecio hesperius						X	X	
Sidalcea malvaeflora ssp. patula		X	X					
Sophora leachiana					X	X		
Streptanthus howellii	X						X	
Trillium angustipetalum			X	X				
Triteleia hendersonii var. leachiae			X	X				
Viola primulifolia ssp occidentalis	X						X	

RARE PLANT SPECIES included in the above table are FS R6 Sensitive Species, BLM Sensitive and BLM Assessment species, O.N.H.P. and C.N.P.S. List 1 and 2 Species (Oregon Natural Heritage Program and California Native Plant Society), and selected taxa that are a local biodiversity concern. Species that are rare only in California have (CALIF) following their scientific name; only locations in California are noted.

B. Northwest Forest Plan Survey and Manage vascular plants, bryophytes, lichens, and fungi

Vascular plants with S&M status that occur in these LSRs are:

Cypripedium fasciculatum	Clustered lady-slipper orchid
Cypripedium montanum	Mountain lady-slipper orchid
Eucephalus vialis	Wayside aster

They are discussed above with the Special Status plants, and in Table 3.

Non-Vascular Plants

Bryophytes with S&M status that occur in these LSRs are:
Buxbaumia viridis (CALIF), is present on California portions of East IV LSR
Orthodontium gracile, two sites in the South Chetco LSR
Ptilidium californicum (CALIF), many sites in the California portion of East IV LSR

Lichens with S&M status that occur in these LSRs are:
Leptogium cyanescens, one site in East IV LSR (or may be in adjacent wilderness instead)
Platismatia lacunosa, one site in Northwest Coast LSR
Usnea longissima, one site in Fishhook LSR

Fungi with S&M status that occur in these LSRs are:
Arcangeliella camphorata, one site in South Chetco LSR
Gomphus clavatus, one site in South Chetco LSR
Rhizopogon ellipsosporus, one site in East IV LSR
Rhizopogon truncatus, one site in South Chetco LSR, two sites in East IV LSR, one site in Taylor LSR, and one site in Fishhook LSR.

Except for *Eucephalus vialis,* which is not a late-successional species, and possibly *Leptogium cyanescens,* which may not be clearly associated with late-successional forest in our area, management activities that promote the development of late-successional forest in these LSRs is likely to increase potential habitat acres or habitat quality for these taxa. Prescribed burning, however, even if designed to reduce the likelihood of stand-replacing wildland fire, is likely to kill these bryophytes and lichens and may consume enough duff and litter to negatively affect the habitat of these fungi.

Note: On March 22, 2004, the Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines was signed by the deciding officials. This decision eliminates the S&M standards and guidelines and, over time, will move eligible species to the FS sensitive species program and the BLM Special Status Plants program. At this time, it is not known which species of S&M vascular plants, bryophytes, lichens, and fungi will gain this new status. Therefore, the team responsible for this May 2004 update of the LSR Assessment elected to keep this S&M sub-section in case these taxa continue to be recognized in some fashion in future agency planning efforts.

Table 4 - Botanical Land Allocations, in acres (National Forest unless otherwise noted).

LSR	Botanical Allocations			
	Botanical Sites/MA-9's	Botanical Areas	Research Natural Areas	Area of Critical Environmental Concern
South Chetco		Redwood Groves 551 Snake Tooth, 21 Vulcan, 133	Lemmingsworth Gulch, 966 Wheeler Creek, 336	
North Chetco	273 (2 sites)	Big Craggies, 859 Snow Camp, 1,041 Snake Tooth, 21		
Northwest Coast		Big Tree, 127 Iron Mountain, 1,866 Lobster Grove, 534 Red Flat, 53	Coquille River Falls, 501 Port-Orford-cedar, 1,120	
Fishhook/Galice	30 (2 sites)	Bear Camp, 5,927 Sourgame, 571		
Taylor			N.Fork Silver Crk BLM, 600	
Briggs			HooverGulch, 1,292	
West IV		Babyfoot Lake, 208 Days Gulch, 1,252 Eight Dollar Mtn., 2,623 Oregon Mtn., 2,623		Eight Dollar Mtn BLM, 1,240
East IV/Williams	143 (4 sites)	Bigelow Lakes, 971 Bolan Lake, 466 Page Mtn. Grove, 68 Grayback Mtn., 197	Craggy Peak, 100 Brewer Spruce BLM, 1,594 Grayback Glades BLM 1,069 Pipefork BLM 529	

C. Wildlife Species with Special Status

Proposed, Endangered, Threatened, and other selected species are described below. Federal lands in the assessment area are home to a variety of wildlife species. A number of these species are dependent on late-successional forest.

Late-Successional Reserves were designed to insure maintenance of viable populations for spotted owls and other "Late-Successional and Old-growth Related Species Within the Range of the Northern Spotted Owl." Table 5 provides (1) a list of late-successional associated species known or suspected to exist within the Late Successional Reserves and (2) information on their locations (some species listed below are not Late Successional, but are listed because they are Sensitive, Management Indicator Species [MIS], etc.). Wildlife species are grouped in six categories in Table 5.

1. Endangered, Threatened, or Proposed (per Endangered Species Act)
2. Sensitive (Forest Service designation - FSM 2670)
3. Survey and Manage/Protection Buffers (Northwest Forest Plan)
4. Late Successional species listed in Appendix J2 (Northwest Forest Plan, Final EIS)
5. Management Indicator Species (Forest Service)
6. Special Status Species (Bureau of Land Management) Manual 6840

Most of the data in Table 5 was gathered from Forest Service and BLM files and databases. Extensive surveys have been made for spotted owl, marbled murrelet, bald eagle, and osprey; for most other species, data gathering was either opportunistic or associated with specific activities (such as timber sales). Even though sighting data for some species is sparse and/or opportunistic (random information, and not gleaned from statistically sound scientific studies, Table 5 shows that LSRs and other land allocations in the assessment area with no programmed timber harvest contain the majority of known locations for these species.

Detailed population data on animal species is difficult to gather, and always will be; information on habitats is typically more extensive than actual population data. The ebb and flow of habitat acres over time can act as a surrogate in lieu of actual population data on individual species. An assumption has to be made that the unique structures and composition inherent in various habitats harbor unique processes, which affect animal populations. Thus, the main focus of this entire assessment is vegetation, or habitat. However, one animal species inhabiting the assessment area is available for use as a "fine filter," to provide a gauge on how the Northwest Forest Plan "is working." Over the entire assessment area, we have the most data on spotted owl. Existing data and data we continue to collect on this species serves as this "fine filter," to help us judge how well the LSRs in the assessment area are performing their function as "habitat for late-successional and old-growth forest related species within the range of the northern spotted owl".

Endangered and Threatened Wildlife Species: Three species listed as Endangered or Threatened are found on federal lands in the assessment area: bald eagle (T), marbled murrelet (T), and northern spotted owl (T). Any activities near nest sites which "may affect" individuals or their habitat must be consulted on with USDI Fish and Wildlife Service (per Endangered Species Act).

Bald Eagle. On the federal lands in the assessment area, major rivers provide the best habitat for bald eagles. Bald eagle habitat on federal lands in the assessment area is managed in accordance with the Pacific Bald Eagle Recovery Plan (USDI Fish and Wildlife Service 1986), and Working Implementation Plan for Bald Eagle Recovery in Oregon and Washington (Washington Dept. Wildlife 1989). In addition, Standards and Guidelines 4-3/4-4 of the Land and Resource Management Plan for the Siskiyou National Forest (1989) applies, as well as direction contained in the Medford District Record of Decision and Resource Management Plan (1995). Management plans may be developed for one or more nest sites. The Siskiyou's single known nest occurs along the Rogue River (in the Wild Rogue Wilderness), but eagles are occasionally sighted along the Chetco and Illinois Rivers. LSRs provide some habitat for Bald Eagle, but the best habitat is within the Rogue River Wild and Scenic River corridor.

Marbled Murrelet. Accounts of the taxonomy, ecology, and reproductive characteristics of the marbled murrelet are found in the 1988 Status Review (Marshall 1988); the final rule designating the species as threatened (USDI 1992); the rule designating critical habitat for the species (USDI 1996); and the Service's biological opinion for Alternative 9 (USDI 1994b) of the FSEIS (USDA/USDI 1994a) for the Northwest Forest Plan. The document "Ecology and Conservation of the Marbled Murrelet" (Ralph et al. 1995) provides a recent summary of the species. See also USDA FS/USDI BLM 2003 (programmatic consultation for FY04-08).

Murrelets have been found in old-growth Douglas-fir or coastal redwood stands which occur on the western part of the Siskiyou National Forest. This is Franklin and Dyrness' (1973) western hemlock (*Tsuga heterophylla*) vegetation zone (Tom Atzet, Ecologist for the Siskiyou National Forest, notes that much of this general "zone" is actually climax to tanoak [*Lithocarpus densiflorus*]). Do not confuse "Tanoak Zone" with the various plant series containing "tanoak" (LIDE3) in their titles. "Tanoak Zone" refers to a much more general classification that describes the coast side of the assessment area, where summer fogs are common (Atzet and Wheeler 1982). Murrelets were not detected east of this vegetation zone. Beginning near the California and Oregon border and bearing north, this vegetation zone runs 20-28 km (13-18 mi) inland parallel to the Pacific Ocean, until it reaches the Elk and Coquille river drainages, where it extends up to 60 km (37 miles) inland. Table 6 displays the number of acres of capable and suitable habitat for marbled murrelet contained within the federal lands in the assessment area.

To summarize, murrelets have not been located more than 51.5 km (32 mi) inland on the Powers Ranger District or more than 25.7 km (16 mi) inland in the Gold Beach or Chetco Ranger Districts (Dillingham and others 1995; USDA FS/USDA BLM 1996; Appendix M in USDA FS/USDA BLM 2001).

Marbled murrelet habitat must be managed according to the standards and guidelines in the ROD for the Northwest Forest Plan (USDA/USDI 1994). All federal lands in the assessment area lie within survey Zones 1 and 2 for the marbled murrelet (USDA/USDI 1994). Zone 1 covers the area from the ocean shore to 35 miles inland; Zone II covers the area from 35 to 50 miles inland (ROD page C-10, plus Alternative 9 Map included with the Final EIS). The East IV, Williams, West IV, Briggs, Taylor, Galice, and Fish Hook LSRs are all well beyond the area where murrelets have been previously detected in SW Oregon (Dillingham, Miller, and Webb 1995, Alegria et al. 2001).

Survey visits (nearly 10,000, through 2003) have been conducted on approximately 25 percent of the potential habitat for marbled murrelet (Zones 1 and 2) on the Siskiyou National Forest and Medford District BLM. In Southwest Oregon, the climate is markedly different in coastal areas than at inland sites. Dillingham, Miller, and Webb (1995) analyzed "Marbled Murrelet Distribution in the Siskiyou National Forest of Southwestern Oregon" (also included surveys done on the Medford District BLM). They found that murrelets did not occur east of the first major ridge inland from the Pacific Ocean. On 4 March 2002, a follow-up study was completed Southwest Oregon on lands administered by the Siskiyou and Rogue River National Forests and the Medford District BLM. The study area was divided into four zones (A, B, C, and D) representing areas at increasing distances from the Oregon coast, and closely tied to the transition from the hemlock/tanoak vegetative zone to the more inland mixed conifer/mixed evergreen zone. Zones C and D represent the mixed conifer/mixed evergreen zone and extend to 50 miles inland. These zones were modified based on the marbled murrelet zones 1 and 2 as described by the Forest Ecosystem Management Assessment Team.

The study provided results on the occurrence of murrelets within the four inland zones. A statistically valid approach was instituted that evaluated the likelihood of murrelets occurring at the two farthest inland zones (C and D). Murrelets were not detected during the study in zones C and D with the exception of one survey visit where audible calls only were heard. The statistical modeling showed a very low likelihood of murrelet occurrence; any impacts to the species in zones C and D would be negligible. The application of these results is consistent with the marbled murrelet recovery plan because intensive surveys and analytical methods were used to more accurately delineate the inland boundary of nesting habitat. This study refined the existing survey zone boundaries to better reflect known murrelet occurrence. Area A encompasses the known range of the marbled murrelet. Area B is a "buffer" to area A and includes all land 10 km east of Area A. Surveys are now conducted only in Areas A and B. Federal Land east of B is assumed to not be murrelet habitat. Therefore, surveys have been discontinued for marbled murrelets in zones C and D, as defined in the final report (excluding the California portion of the Siskiyou Forest).

Within Area A, from 1988 through 2001, murrelets were detected during 704 surveys. Seven surveys in Area B resulted in detections (within a maximum 0.78 miles of the A/B border – the outcomes of six of these surveys were "undetermined," and one was "fly though canopy," or "occupancy"). One "undetermined" detection occurred in Area C. Of these 712 surveys, 149 (though year 2000) resulted in a determination of "occupancy" (verification of occupied stand) (Table 6).

Critical habitat for marbled murrelet is present on the Siskiyou National Forest and adjacent BLM lands. Critical habitat essentially constitutes all LSRs described in the draft NW Forest Plan within 35 miles of the ocean. Where critical habitat is designated, it coincides with the LSR land allocation (see Critical Habitat map in Alegria and others 2002). Portions of the existing South Chetco, North Chetco, and Northwest Coast LSRs owe their existence to the presence of existing occupied Marbled Murrelet Sites (NWFP ROD, page C-10). The ROD also provides direction to protect all contiguous existing and recruitment habitat within 0.5 miles of any newly discovered occupied site (a circle of 0.5 mile radius contains 503 acres). These protected areas then become "new" LSRs. Though 2003, 14,494 acres of new "murrelet" LSRs have been created (mapped on GIS layer). Other new "murrelet" LSR sites will undoubtedly be added in coming years.

Critical habitat for marbled murrelet within the Forest totals 382,056 acres, with 96,219 acres within the perimeter of the Biscuit Fire; 20,341 acres of critical habitat are actually within the known range of the marbled murrelet in SW Oregon (Area A), and within the fire perimeter. Only a small portion of this critical habitat is actually suitable nesting habitat and within the known range (3,083 acres). Critical habitat for the marbled murrelet was designated in May of 1996, well before the known range was established, as described in Alegria and others (2002).

Only a small portion of the murrelet's known range (20,341 acres in Area A) was affected by the Biscuit fire, and very little nesting habitat (1,639 acres) was lost. Within the known range, within the Biscuit Fire perimeter, and within Critical Habitat for marbled murrelet, 2,167 acres of suitable nesting habitat remains, post-fire (loss of 916 acres in CHU/LSR – an additional 723 acres was lost outside of LSRs/CHU).

The Fire encompassed fourteen sites in LSR where murrelets had been previously detected. Six sites were accounted for at the head of Lawson Creek: one survey had resulted in an "occupied" behavior ("fly-though-canopy"), and five surveys had resulted in "presence" (one "circling" behavior and four surveys were recorded as "unknown"). The occupied behavior had occurred 0.70 miles beyond (east of) the Areas A/B boundary. The maximum distance inland beyond the A/B boundary for any of these six surveys was 0.78 miles. In the Red Mountain/Boulder Creek area (0.50 miles inland beyond the Areas A/B boundary), one survey resulted in "presence" ("fly-over-canopy"). Three survey sites which had returned "presence" detections in the upper East Fork Pistol River drainage were within the fire area; this location was in Murrelet Area A (one "unknown," two "fly-over-canopy"). In the nearby Meadow Creek area, within the Fire area and within Murrelet Area A, three more "presence" surveys had occurred; all three were classified as "unknown."

The Biscuit Fire, because it engaged 39,023 acres (11%) of the known range for murrelet on the Siskiyou NF, will have a negligible effect on the viability of marbled murrelet in SW Oregon. Although 96,219 acres of Critical Habitat (all in LSR) for marbled murrelet is within the Fire perimeter, only 20,341 of this Critical Habitat is within the murrelet's known range. Critical Habitat was designated in SW Oregon before the known range had been established (see Alegria and others 2002). Critical Habitat ("aka" LSR) for marbled murrelet which is actually suitable nesting habitat, and which is within the known range for this species, amounted to 47,300 before the fire and 46,381 after the fire.

Spotted Owl. A detailed account of the taxonomy, ecology, and reproductive characteristics of the spotted owl is found in the 1987 and 1990 Fish and Wildlife Service Status Reviews (USDI 1987, 1990a); the 1989 Status Review Supplement (USDI 1989); the ISC Report (Thomas et al. 1990), and the final rule designating the spotted owl as a threatened species (USDI 1990b). See also USDA FS/USDI BLM 2003 (programmatic consultation for FY04-08). Spotted owl habitat will be managed according to the standards and guidelines in the ROD for the Northwest Forest Plan (USDA/USDI 1994). The draft recovery plan for the spotted owl (USDI FWS 1992) indicates that large clusters of viable owl pairs interconnected across the range of the species is necessary for the conservation of the species. Most (estimated 80%) of the federal lands in the assessment area have been surveyed for spotted owls in the last decade (Table 5).

LSRs and other land allocations with no programmed timber harvest (such as wilderness) provide a foundation of habitat connections for the spotted owl; clusters of owl activity centers are well distributed across areas with no programmed harvest on the Siskiyou and adjacent BLM LSRs. In general, future timber harvest in Matrix is not expected to preclude the LSRs and other "no programmed harvest" land allocations within the federal lands in the assessment area from maintaining or attaining viable clusters of spotted owls, as intended by the Northwest Forest Plan (USDA/USDI 1994) (Table 6 shows acres with no programmed harvest).

As displayed in Tables 6 and 7, approximately 208 spotted owl activity centers are located on the federal lands in the assessment area. LSR acres on the assessment area equal 719,593 (58 % of this land area) (Table 7). Of the approximately 1,304,000 acres in the entire area, approximately 1,137,000 acres (92%) are protected under various land allocations within the Northwest Forest Plan (LSR, Riparian Reserves, etc.), or within congressionally reserved/administratively withdrawn lands; these lands with no programmed harvest support approximately 178 (89%) activity centers (pairs or resident singles).

Table 7 shows how many acres of capable and suitable habitat for spotted owl are contained within the federal lands in the assessment area. Most (59%) of the owl home ranges in LSRs (outside the Biscuit Fire) and other areas with no programmed timber harvest contain 40 percent or more late successional forest (1,360 or more acres) (% suitable habitat from 1993 Fish and Wildlife Service analysis, plus other site-specific BLM and Forest Service data). For 16 percent of the home ranges, the proportion of suitable habitat is between 30 and 39 percent; only 25 percent of these sites contain less than 30 percent suitable habitat within the home range (contain less than 1,020 acres).

HABITAT DEFINITIONS

The majority of northern spotted owl studies have focused on defining NFR habitat, and found older forest is synonymous with spotted owl habitat; however, few used the same measures and indices (Franklin and Gutierrez, 2002). The following studies concluded a strong association between spotted owls and older forest: Zabel et.al. 1995, Irwin 2003, Everett et al. 1997, Carey et al. 1997, Ripple et al. 1997, Hunter 1994, and Meyer et al. 1998; Franklin and Gutierrez, 2002), however, each used different definitions for older forest. Definitions ranged from 8-25" dbh with 30-70 percent canopy closure in the dry eastern Cascade Mountains (Irwin, in press 2003) to greater than 39" dbh with more than 40 percent canopy closure in Southwestern Oregon, near Roseburg (Carey et al., 1997). Klamath Province area studies by Hunter 1994, Ripple 1997, and Zabel et al. (1995) identified suitable habitat as greater than about 21" dbh with more than 30, 40 or 70 percent canopy closure respectively; Meyer et al. (1998) found that greater proportions of hardwoods increase reproductive output. **For this document, late-successional habitat (mature and old growth), which is synonymous with nesting-roosting habitat for northern spotted owls (based primarily on Zabel et al. 2003), is defined as stands dominated by trees greater than 21" dbh with greater than 40% over-story canopy cover, and this project defines 9-21" dbh with greater than 40% canopy closure as dispersal-foraging habitat.**

Home range sizes for northern spotted owls appear related to availability and types of primary prey species. Home ranges are larger where flying squirrels are primary prey than where woodrats are primary prey (Zabel et al. 1995, Franklin et al. 2000). In addition, in the Klamath Province, survival of owls increased with the amount of late-successional forest around nest cores while reproductive success increased with the amount of edge. There appears to be a dynamic balance between the amount of interior habitat and the amount of fragmentation that affects survival and reproductive success for northern spotted owls (Zabel et al. 1995, Meyer 1998, Franklin and Gutierrez 2002).

Zabel et al. (2003) developed and tested models for predicting occupancy of habitat by northern spotted owls. These models were based on a number of spotted owl habitat definitions, including the definition of late successional forest in the Northwest Forest Plan. They tested these habitat descriptions for many areas in northern California, including an area similar to the Biscuit Fire: the Western Klamath area. The habitat description that best predicted occupancy of northern spotted owls generally described nesting roosting habitat as greater than 17" dbh with greater than 40 percent canopy cover, and generally described foraging habitat as between 10" and 35" dbh with over 40% canopy cover. They found habitat descriptions that incorporated nesting and roosting with foraging predicted occupancy in the Klamath Province better than the habitat definition in the Northwest Forest Plan. They also found that the best scale for analysis of habitat suitability was 200ha, or a .5 mile radius circle.

Summary of Desired Conditions for Late Successional Forest Habitat. Late successional forest habitat is generally synonymous with northern spotted owl nesting-roosting-foraging (NRF) habitat. The desired conditions for late successional forest habitat within the Biscuit Recovery Area are the range of historic conditions for those habitat attributes identified by research, and these desired conditions vary somewhat by fire regime. The habitat attributes for NRF habitat are total amount of late successional forest (> 21" dbh and > 40% canopy closure), amount of interior late successional forest in large patches, and amount of old growth forest (>32" dbh and > 40 percent canopy closure). Habitat attributes for dispersal/foraging-only are 9-21" dbh and > 40 percent canopy closure. Habitat attributes for enhancing prey species abundance are related to the amount of deadwood and edge; deadwood amounts should be based upon data collected from natural stands (Randall Miller, personal communication) and amount of edge should be based upon

historic conditions. Concentrations of deadwood adjacent to suitable habitat could increase availability of prey species for spotted owls.

Thirty (30) Known Spotted Owl Activity Centers were established in land areas that would otherwise be at least partially in Matrix. These 100-acre LSRs (Activity Centers) were established per the ROD direction on page C-10. These reserves were established for owl activity centers discovered prior to January 1, 1994). These sites are NOT shown on the LSR map attached to this assessment. For each of the 30 pairs listed in Table 6 as within "Matrix" (actually within LSRs termed "Known Spotted Owl Activity Centers"), Riparian Reserves actually constitute approximately 35 to 40 percent of the home range for each pair (average amount of the land base in streams which receive the protection buffers, as outlined in the Aquatic Conservation Strategy of the Northwest Forest Plan - USDA FS/USDI BLM 1994). In general, these Known Spotted owl Activity Centers do not contain interior late-successional forest.

Critical Habitat for the northern spotted owl was designated on January 15, 1992. All or part of nine Critical Habitat Units (CHU) for spotted owl are located on the Siskiyou and adjacent BLM LSRs. Within the Siskiyou and adjacent BLM LSRs, CHUs cover 300,611 acres (Table 8). When LSR allocations were applied to the federal lands in the assessment area as a result of the Northwest Forest Plan (USDA/USDI 1994), all but 17 percent (60,874 acres) of the CHUs acres were found to be overlain by LSRs. In other words, the constituent elements (FWS term) of habitat for spotted owls will be protected or enhanced on the 83 percent of the designated Critical Habitat within LSRs.

Map 4 shows that the CHU area not covered by LSR is scattered throughout federal lands in the assessment area, and is mainly on the edges of LSRs. If a project (such as a thinning) occurs within CHU, and is determined to "may affect" Critical Habitat, consultation must be initiated with the USDI Fish and Wildlife Service; in general no net loss of suitable habitat for spotted owl should occur in CHUs, as a result of planned projects.

Change to Spotted Owl Habitat as a Result of the Biscuit Fire

In 1995, 208 spotted owl activity centers were known from the Siskiyou National Forest and adjacent BLM LSRs. All or a portion of 42 centers (as of 2002) are located within the perimeter of the Biscuit Fire (Table 4a). One of these 42 home ranges is located on the BLM portion of the fire area; the remaining activity centers are on National Forest. LSR acres on the Siskiyou National Forest equal 576,981 (53 % of the Forest). Lands with no programmed timber harvest (non-Matrix) support approximately 85 percent of the known activity centers (pairs or resident singles).

Table 4a. Known Spotted Owl Activity Centers Affected by the Biscuit Fire (acres calculated with low and medium productivity serpentine acres classified as non-habitat) (503 acres per home range). Dispersal Acre totals do include Suitable Acres.

	Pre-fire Habitat w/in 0.5 Miles			**Post-Fire Habitat w/in 0.5 Miles**		
Activity Center #	Dispersal Acres	Suitable Acres (NRF)	% Suitable (NRF)	% Suitable (NRF)	Suitable Acres (NRF)	Dispersal Acres
19	474	342	67	0	0	0
98	437	229	46	36	180	263
101	298	163	32	32	162	297
107	416	342	68	6	30	35
117	438	301	60	30	149	207
142	414	351	70	69	345	400
143	445	313	62	62	313	445
151	479	394	78	32	161	268
152	339	301	60	7	34	41
153	423	349	69	7	36	43
156	449	225	45	28	139	449
161	421	381	76	71	357	385
162	404	225	45	25	125	404
196	426	195	39	33	164	335
202	426	331	66	66	331	426
204	486	164	33	32	160	467
216	491	336	67	30	152	174
222	441	380	76	70	354	395
223	462	375	75	71	359	423
229	443	282	56	50	254	371
232	493	441	88	58	293	307
248	375	328	65	59	297	333
256	276	129	26	25	127	271
261	218	155	31	23	114	218
275	444	343	68	66	334	430
276	406	145	29	17	87	271
277	400	266	53	48	243	328
287	424	246	49	38	193	251
294	358	124	25	21	105	305
301	336	229	46	14	70	90
309	398	146	29	26	131	358
315	420	304	60	43	215	302
320	186	162	32	31	155	171
321	493	347	69	42	212	271
326	422	358	71	50	249	271
333	312	280	56	40	202	215
366	398	145	29	29	144	398
367	366	289	57	57	289	366
371	426	350	70	60	303	357
379	104	70	14	0	0	0
380	396	261	52	7	33	34
Sourgrass (BLM site)	Habitat has not been assessed; minimal loss of suitable habitat; area was burned at low severity; % suitable habitat in 30-39% range pre- and post-fire.					
TOTAL 42 sites	16,263	11,097	54	37	7,601	11,375

Table 4b shows how many acres of capable and suitable habitat for spotted owl are contained within the Siskiyou National Forest and inside the perimeter of the Biscuit Fire.

Table 4b. Effects of the Biscuit Fire on habitat for Spotted Owl (adjacent BLM lands included). Suitable (Nesting, Roosting, Foraging) and Dispersal habitats. By various Land Classification Schemes.

Summary: 67,701 acres of suitable (NRF) habitat was lost (43%) in the Biscuit Fire, on federal land on the Siskiyou NF and adjacent BLM land, and 117,578 acres of Dispersal habitat was lost (59%) (i.e., 67,701 acres of suitable, and another 49,877 acres of Dispersal-only habitat). Dispersal habitat acres include suitable habitat acres.

By all Wildernesses (Forest-Wide) or Individual LSR	Suitable Habitat Acres			Dispersal Habitat Acres		
	Pre-fire	Post-Fire	Lost (%)	Pre-fire	Post-Fire	Lost (%)
All Wildernesses	90,195	65,399	24,796 (27)	139,099	93,524	45,575 (33)
Briggs LSR	25,094	14,307	10,787 (43)	34,453	19,500	14,953 (43)
East IV [NF]/Williams [BLM] LSR	52,061	52,061	0 (0)	*36,933	*36,933	0 (0)
Fishhook [NF]/Galice [BLM] LSR	118,211	101,448	16,763 (22)	*109,771	*80,003	*31,640 (n/a)
North Chetco LSR	10,000	8,886	1,114 (11)	18,498	15,147	3,351(18)
Northwest Coast LSR	70,598	70,598	0 (0)	108,526	108,526	0 (0)
South Chetco LSR	30,421	30,028	393 (1)	52,042	51,118	924 (2)
Taylor LSR	4,912	4,912	0 (0)	6,432	6,432	0 (0)
West IV LSR	6,009	2,022	3,987 (66)	9,919	2,820	7,099 (72)
TOTAL	407,501	349,661	57,840 (17)	515,674	415,648	101,928 (20)
Other Land Allocations – Forest-Wide						
Matrix (MA-12, 13, 14, 15) and Protected other than LSR (MA-8) and Wilderness (MA-1) = (MA-2, 3, 4, 5, 6, 7, 9, 10, 11)	60,970	52,060	8,910 (15)	103,253	86,652	16,601 (16)
GRAND TOTAL	468,471	401,721	66,750 (17)	618,927	501,349	117,578 (19)

Acre figures on each line include the entire area (for each LSR), both inside and outside of the fire line, but only within the boundary of the Siskiyou National Forest or adjacent land Managed by the Medford District of the Bureau of Land Management. Existing Suitable (*NRF)* habitat is considered to be all Medium, Large, and Giant conifer stands with a canopy closure of $\geq$ 40. The "breaks" for canopy cover in the Siskiyou's Vegetation GIS layer are at 40 and 70 percent, but suitable habitat for spotted owl is classified as older stands which have a canopy closure of $\geq$60. Because most natural non-serpentine stands between 40% and 70% are actually 60%+, we classify Suitable habitat as $\geq$40%. However, regardless of canopy closure %, serpentine areas of Low or Moderate productivity are not considered Capable of becoming Suitable habitat (High productivity areas *are* considered Capable); these Low and Moderate serpentine areas have been removed from the calculation of Suitable habitat within the Fire perimeter. Dispersal acre columns also include Suitable Habitat acres, and serpentine habitat *can* serve as dispersal habitat. Dispersal habitat = all Sapling, Small, Medium, Large, and Giant conifer stands with a canopy closure of $\geq$ 40%. * = BLM dispersal acres in Galice LSR outside the fire area is not included in Pre and Post figures; however, dispersal lost inside the fire area does include BLM; dispersal acres in the Williams LSR not included.

Critical Habitat for the northern spotted owl was designated on January 15, 1992. All or parts of nine Critical Habitat Units (CHU) for spotted owl are located on the Siskiyou National Forest. Within the Siskiyou's LSRs, CHUs cover 242,417 acres. Within the Fire perimeter, CHU acres total 131,604 (see Table 4c).

Table 4c. Critical Habitat within Fire perimeter, for spotted owl CHUs impacted by the Biscuit Fire ("Total Acres in CHU" includes acres both inside and outside of fire perimeter, both BLM and NF land – most of OR-65 is on BLM, and BLM acres not included in pre and post-fire data columns. Pre- and Post-fire acres are *only* within the Siskiyou NF).

Entire CHU, in and outside Biscuit Fire perimeter				Pre-Fire NF within Biscuit Fire perimeter		Post-Fire NF within Biscuit Fire perimeter		
CHU #	Total Acres in CHU	Area with Potential to Produce LS habitat	Total Ac NF in CHU	Acres Dispersal	Acres NRF	Acres Dispersal	Acres NRF	% NRF Lost to fire
OR-65	74,664	61,872	GIS numbers not run on new habitat definitions	305	1,016	173	930	8
OR-68	13,382	13,223		1,873	9,208	1,579	7,257	21
OR-69	26,616	23,683		4,677	12,763	1,294	6,972	45
OR-70	36,943	23,148		6,516	19,382	4,024	12,174	37
OR-71	53,784	53,162		16,427	24,736	16,093	24,515	1

Of the 42 spotted owl home ranges entirely or partially located within the Recovery Area (Table 4d), only 13 still contain 50 percent or more suitable habitat, where occupancy and reproduction are expected to continue at a normal level. Before the fire, 25 home ranges had 50 percent or more suitable habitat. The total number of home ranges containing 50 percent or more suitable habitat in the Recovery Area declined from 60 to 31 percent, a 52% reduction.

Twenty-two home ranges now contain 16 to 49 percent suitable habitat (diminished occupancy and reproduction rates), compared with 16 before the fire. Seven home ranges now contain 15 percent or less suitable habitat, a level at which occupancy and reproduction may cease. Only one was in this condition before the fire.

Table 4d. Effects summary of the Biscuit Fire on known spotted home owl ranges (41) on NF, 1 on BLM).

Home Range Category	Number of Owl Home Ranges (%)	
	Pre-fire	Post-fire
Home Ranges w/ ≥50% suitable	25 (60)	13 (31)
Home Ranges w/ 16-49% suitable	16 (38)	22 (52)
Home Ranges w/ ≤15% suitable	1 (2)	7 (17)
TOTAL Home Ranges	42 (100)	42 (100)

Of the 158,132 acres of suitable nesting habitat available in the Recovery Area prior to the fire, 67,701 was lost, a 43 percent reduction (Table 4b). Forest-wide, 17 percent of suitable habitat was lost in the fire, six percent of the habitat in the entire Rogue River/South Coast basin. The fire also set back 49,877 acres of dispersal-only habitat to the pioneer stage. Connections for dispersal habitat were severely disrupted by the fire. East-west dispersal corridors were significantly reduced by the fire.

East-west dispersal corridors exist only in limited areas within the Fire perimeter (see discussion in vegetation discussion). Whereas it will take upwards of 160 years or more for suitable nesting habitat to return to areas which were set back to the pioneer stage, dispersal habitat can return in 30 to 40 years. Short-term reductions in available prey base are expected in forest stands that may still be suitable for nesting, but where understory vegetation was lost. For the next year or two, owl pairs may still inhabit some now marginal home ranges, but may then abandon these sites if prey resources are not substantial enough to allow reproduction to occur. Corridors of suitable and dispersal habitat for spotted owls still function in the "donut" surrounding the fire area. Even though suitable owl habitat has been reduced by six percent in the Rogue/South Coast Basin, the Forest still expects to retain a functioning population of spotted owls and connections to habitat managed by other Forests and BLM districts.

Table 4b displays the changes in habitat available to spotted owls as a consequence of the Biscuit Fire. Habitat changes are displayed by land allocations, including individual LSRs.

Within the Fire perimeter, 22,208 acres of suitable habitat in five separate Critical Habitat Units were lost (see Table 4c). This represented 34 percent of the suitable nesting habitat in the five CHUs. Table 4e displays the effects of the Biscuit Fire on late-successional habitat in the Late-Successional Reserves.

TABLE 4e Late-Successional Reserves Affected by the Biscuit Fire						
LSR NAME	FEDERAL ACRES IN LSR	Area with Potential Acres (%) 1/	Existing Late Successional Acres (%), **Pre-fires** 2/	Existing Late Successional Acres, **Post-fires** (%) 2/	Acres Late Successional Habitat in column 4 lost to Fires (%)	Fire Names
South Chetco 3/	71,382	67,684 (95)	30,421 (45)	29,828 (44)	593 (2)	Biscuit/Repeater
North Chetco 3/	28,199	26,476 (83)	10,000 (38)	8,886 (34)	1,114 (11)	Biscuit
Fish Hook/ Galice 3/	234,860	217,826 (92)	118,211 (54)	101,448 (47)	16,763 (14)	Biscuit
Briggs 3/	53,980	35,785 (60)	25,094 (70)	14,307 (40)	10,787 (43)	Biscuit
West IV 3/	53,738	11,558 (22)	6,009 (52)	2,022 (18)	3,987 (66)	Biscuit
TOTAL	442,159	359,329 (81)	189,735 (53)	156,691 (44)	35,146 (19)	

1/ Area left after serpentine, meadows, rock, water, and grass have been removed (% is of column 2).
2/ Percent figures in this column are "percent of the percent"' in column 3.
3/ Areas with Late Successional characteristics that includes Late or Giant seral stages with >40% canopy closure - "Late" equals trees with at least 21 inch DBH.

Sensitive Wildlife Species: For most sensitive species, sighting data are limited (Table 5). There are several exceptions. We have 104 American marten sighting locations on the federal lands within the analysis area. We have 84 locations for goshawk. Del Norte salamanders are known from 539 sites.

Survey and Manage Wildlife Species: Eleven species included in this category require pre-project surveys. Two of these species (Siskiyou Mountain salamander and great gray owl) are classified as sensitive). Six of these species are bats that "require additional protection" (Survey and Manage ROD, USDA FS/USDI BLM 2001). Extensive surveys for bats have not occurred on the Siskiyou, but some or all of these species are likely to be present; the BLM has monitoring sites for bats in LSRs under their jurisdiction (see data in Table 6). Red tree voles are likely to be present in most suitable habitat. The survey and manage program will be absorbed into the sensitive program in the near future. (USDA FS/USDI BLM 2004).

Late-Successional wildlife species listed in Appendix J2: In addition to the Survey and Manage species listed in table 3-C of the ROD, a number of additional species were analyzed for the Final SEIS (for the Northwest Forest Plan). Information was generated on the impacts of activities on non-federal lands and other sources of cumulative effects. Appendix J2 of the Final SEIS provides specifications of mitigation measures that could be employed to benefit the species. Eight wildlife species listed in Appendix J2 are present on the federal lands in the assessment area (Table 5). Seven of the eight species are included in the Sensitive (FS) or Special Status Species (BLM) programs. Data in Table 5 indicates LSRs and other land allocations with no programmed timber harvest likely provide an important habitat base for these species.

Wildlife Management Indicator Species (FS): Eight Management Indicator Species were used to gauge the effectiveness of the 1989 Land and Resource Management Plan for the Siskiyou National Forest. Three of these animals are Threatened or Sensitive species. Several of the others (listed in Table 5) are dependent on Late Successional Forest, such as osprey and pileated woodpecker. Most osprey sightings (most representing nesting birds) in our database were located in land allocations with no programmed timber harvest.

Recorded sightings of pileated woodpecker occurred most of the time in areas with no programmed timber harvest. Even Roosevelt elk, which rely on a combination or late and early successional stages, were recorded most of the time in areas with no programmed timber harvest (see below for discussion of Elk Areas, under Unique Habitats); in the future, pioneer vegetation will be in short supply in these areas, except in the Biscuit Fire area. Data for blacktail deer is displayed in Table 5 in terms of early successional

stage vegetation as a result of the Biscuit Fire. 67,701 acres formerly dominated by medium, large and giant tree stands were converted to brush/sapling (pioneer – non-serpentine) plant communities by the fire. When all levels of site productivity, including serpentine, are analyzed, the majority of the overstory is dead on 293,000 acres. These acres provide an abundance of high quality, short term, forage for big game. The welfare of woodpeckers is expressed in terms of percent habitat capability.

Wildlife Special Status Species (BLM): These Special Status Species (SSS) animals are recognized by federal or state government as needing particular consideration in the planning process, due to low populations (natural and human-caused), restricted range, threats to habitat, and for a variety of other reasons. The list includes species officially listed, or proposed, or candidates for listing under ESA by the USDI Fish and Wildlife Service. State Listed Species are those identified as endangered, threatened, pursuant to ORS 496.004, ORS 498.026, or ORS 546.040.

Also included are Bureau Assessment Species that are animal species found on List 2 of the Oregon Natural Heritage Data Base and those species on the Oregon List of Sensitive Wildlife Species (ORS 635-100-040) and are identified in BLM Instruction Memo No. OR-91-57. Bureau Sensitive species are those eligible for federal listed, federal candidate, state listed, or on List 1 in the Oregon Natural Heritage Data Base, or approved by the BLM state director. Surveys have not been conducted for most species; incidental observations have been recorded for some species.

Page 58 intentionally left out (it is not missing)

Table 5. Endangered, Threatened, Sensitive, and Other Important Wildlife Species. Groups explained in text above. Some species are in more than one group; they are listed only in the first group they are part of, and abbreviations next to the name show which additional groups they belong to. Where data is listed by "detections," this indicates the number of separate observation records in our databases; a single observation may include one or many individuals of a species. Total column reflects current database. Individual LSR's could not be updated at this time.

Wildlife Species	Estimated % Habitat on BLM/FS Surveyed	South Chetco	North Chetco	North-west Coast	Fish Hook/ Galice	Taylor	Briggs	West IV	East IV/ Williams/ Deer	Total All LSRs	Non-Matrix Other than LSR, No Program Harvest	In Matrix	Total
Endangered, Threatened, or Proposed													
# *Bald Eagle Nest Sites (MIS) (SSS)	90% FS 80% BLM	0 -	0 -	0 -	0 3p	0 -	0 -	0 -	0 0	0 0	1 -	0 -	1 0
#*Spotted Owl Activity Centers Check w/BLM	80% FS 50-85% BLM	19 1	4 -	33 4	22 29	2 -	8 -	3 -	19 23	110 57	11 -	30 (2/) -	151 57
# of surveys w/ *Marbled Murrelet Presence (SSS) 4/	30% FS-coast 15% FS-inland 2% BLM	52 0 0	14 0 -	150 0 0	0 3 (3/) 0	0 0 -	0 0 -	0 0 0-	0 0 0	216 3 0	68 1 -	32 0 -	712 3 0
# of surveys w/ *Marbled Murrelet Occupancy 5/	30% FS-coast 15% FS-inland	20 0	4 0	70 0	0 1 (3/)	0 0	0 0	0 0	0 0	94 1	19 0	16 (4/) 0	149 1
Sensitive # Detection Sites													
Foothill Yellow-legged frog	<1% FS <1%BLM	4 -	0 -	0 -	0 0	0 -	0 -	0 -	0 5	4 5	7 -	4 -	27 5
*Del-Norte Salamander (S&M) (SSS)	10% FS 5% BLM	14 -	10 -	31 -	17 1	0 -	6 -	6 -	5 15	89 16	39 -	34 -	539 18
*Siskiyou Mtn Salamander (S&M) 9/	10% FS 3% BLM								Potential Potential				
*Southern Torrent [Olympic] Salamander (J2) (SSS)	<1% FS <1% BLM	5 -	0 -	4 -	1 0	0 -	0 -	0 -	0 3	10 3	4 -	2 -	27 3
California Slender Salamander	<1% FS N/A	Data for individual LSRs not available at this time											8
Common Kingsnake (SSS)	<5% FS <5% BLM	0 -	0 -	0 -	3 1	0 -	1 -	0 -	0 0	4 1	7 -	0 -	14 1
Northwestern Pond Turtle (SSS) 7/	50% FS 50% BLM	1 -	0 -	3 -	2 10	0 -	1 -	0 -	2 3	9 13	42 -	1 -	86 13

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Wildlife Species	Estimated % Habitat on BLM/FS Surveyed	South Chetco	North Chetco	North-west Coast	Fish Hook/ Galice	Taylor	Briggs	West IV	East IV/ Williams/ Deer	Total All LSRs	Non-Matrix Other than LSR, No Program Harvest	In Matrix	Total
Peregrine Nest Sites (SSS) 1/	50% NF 60% BLM	0 -	0 -	1 -	2 1k+3p	0 -	0 -	0 -	1 4p	4 8	2 -	1 -	4 8
*Northern Goshawk (SSS)	5%/NF 2-5% BLM	4 -	3 -	7 -	8 2	1 3	6 -	0 -	9 2	38 7	22 -	17 -	77 7
*Great Gray Owl (S&M) 7/ (Protection Buffers (SSS)	No Surveys	0	0	1	0	0	0	0	0	1	0	0	1
Willow Flycatcher	<2%/NF <1%/BLM	0 -	0 -	1 -	2 2	0 -	0 -	0 -	2 1	5 3	9 -	2 -	16 3
Pacific shrew	No Surveys												5
*Pallid Bat (S&M) (SSS) (Provide Add'l Protection	<1% FS <10% BLM	0 -	0 -	0 -	0 0	0 -	0 -	0 -	0 0	0 0	0 -	0 -	0 0
*Fringed Myotis (S&M) (SSS) (Provide Add'l Protection)	<1% FS <10% BLM	0 -	0 -	0 -	0 1	0 -	0 -	0 -	0 2	0 3	1 -	0 -	1 3
California Wolverine (SSS)	5%/NF	0	0	0	0	0	0	0	2	2	2	1	5
*Fisher (J2) (SSS)	5%/NF	1	0	3	0	0	0	0	2	6	4	2	17
*American Marten (MIS) (J2) (SSS)	15%/NF	2	4	14	16	0	0	0	1	37	21	13	104
Survey and Manage # Detection Sites													
Monadenia chaceana (snail)	<5% FS <5% BLM	Data for individual LSRs not available at this time											0
*Red Tree Vole	<1% FS <5% BLM	0 -	0 -	0 -	0 1	0 -	0 -	0 -	0 1	0 2	1 -	2 -	32 2
*Silver Haired Bat (SSS) (Provide Add'l Protection)	<1% FS <10% BLM	0 -	0 -	0 -	0 1	0 -	0 -	0 -	0 1	0 2	0 -	0 -	0 2
*Long-eared Myotis (SSS) (Provide Add'l Protection)	<1% FS <10% BLM	0 -	0 -	0 -	0 1	0 -	0 -	0 -	0 2	0 3	0 -	0 -	1 3
*Townsend's Big-eared bat (SSS) (Provide Add'l Protec.)	<5%/NF 10% BLM	0 -	0 -	0 -	1 0	0 -	0 -	0 -	0 3	1 3	3 -	30 -	16 3

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Wildlife Species	Estimated % Habitat on BLM/FS Surveyed	South Chetco	North Chetco	North-west Coast	Fish Hook/ Galice	Taylor	Briggs	West IV	East IV/ Williams/ Deer	Total All LSRs	Non-Matrix Other than LSR, No Program Harvest	In Matrix	Total
*Long-legged Myotis (SSS)	<1% FS	0	0	0	0	0	0	0	0	0	1	0	2
(Provide Add'l Protection	<10% BLM	-	-	-	1	-	-	-	1	2	-	-	0
Appendix J2 - North West Forest Plan 11/ # Detection Sites													
*Common Merganser 13/	<10% FS	1	0	3	1	4	0	0	2	11	8	1	20
	<10% BLM	-	-	-	0	-	-	-	0	0	-	-	0
Management Indicator Species (Forest Service)													
*Osprey Sightings 14/	90% FS	3	11	25	12	3	0	0	0	44	181	12	457
	BLM	-	-	-	18	-	-	-	3	21			21
*Pileated Woodpecker	30% FS	50	20	56	39	18	12	26	2	223	97	84	472
	BLM	-	-	-	31	-	-	-	24	55			55
Woodpeckers (as a group) average % habitat capability at present 15/	N/A	Unmanaged Stands At 2.6 Snags Per Acre											
Red-breasted sapsucker	<1% FS <1%BLM	Data for individual LSRs not available at this time											40
Downy woodpecker	<1% FS <1%BLM	Data for individual LSRs not available at this time											38
Hairy woodpecker	<1% FS <1%BLM	Data for individual LSRs not available at this time											123
Northern flicker	<1% FS <1%BLM	Data for individual LSRs not available at this time											154
Acorn woodpecker (SSS)	<1% FS	20	4	12	13	4	4	0	0	53	21	20	94
	<1%BLM	-	-	-	-0	-	-	-	2	2	-	-	2
*White-headed woodpecker	<10% FS	0	0	0	0	0	0	0	5	5	0	3	14
	10% BLM	-	-	-	0	-	-	-	0	0	-	-	-
*Roosevelt Elk; # Sighting Locations 16/	N/A	64	33	147	132	5	12	0	0	393	440	195	1028

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Wildlife Species	Estimated % Habitat on BLM/FS Surveyed	South Chetco	North Chetco	North-west Coast	Fish Hook/ Galice	Taylor	Briggs	West IV	East IV/ Williams/ Deer	Total All LSRs	Non-Matrix Other than LSR, No Program Harvest	In Matrix	Total
Black-tailed Deer % Percent Pioneer Vegetation-Current	N/A	When all levels of site productivity, including serpentine, are analyzed, the majority of the overstory is dead on 293,000 acres. These acres provide an abundance of high quality, short term, forage for big game.											
Special Status Species (BLM Category) # Detection Sites													
Coronis Fritillary Butterfly	<1% FS <1%BLM	0 -	0 -	0 -	0 0	0 -	0 -	0 -	0 0	0 0	0 -	0 -	0 0
*Clouded Salamander (California) (J2)	<1% FS <1% BLM	1 -	1 -	10 -	2 2	1 -	0 -	0 -	0 4	15 6	4 -	3 -	22 6
*Tailed Frog (J2)	<2% FS <2% BLM	4 -	0 -	5 -	1 0	0 -	0 -	0 -	0 6	10 6	6 -	2 -	18 6
*Black Salamander (J2)	not on Sis NF <1% BLM	-	-	-	0	-	-	-	1	1	-	-	1
Western Toad	<1% FS <1%BLM	Data for individual LSRs not available at this time											1
Northern Red-legged frog	20% FS 2% BLM	4 -	1 -	24 -	0 0	0 -	0 -	0 -	0 0	29 0	14 -	3 -	46 0
Sharptail Snake	<1% FS <1%BLM	0 -	0 -	0 -	1 0	2 -	0 -	0 -	0 0	3 0	3 -	1 -	7 0
California Mountain Kingsnake	<5% FS <5% BLM	0 -	0 -	2 -	10 1	5 -	1 -	0 -	0 0	18 1	31 -	1 -	50 1
Northern Sagebush Lizard	<1% FS <1%BLM	0 -	0 -	0 -	0 0	0 -	0 -	0 -	0 2	0 2	0 -	0 -	0 2
Flammulated Owl	<1% FS <1%BLM	0 -	0 -	0 -	0 0	1 -	0 -	0 -	0 1	1 1	0 -	0 -	1 1
*Black Backed Woodpecker (J2) 12/	<1% FS <1% BLM	0 -	0 -	1 -	0 0	1 -	0 -	0 -	0 0	2 0	1 -	1 -	4 0
Lewis Woodpecker	<1% FS <1%BLM	1 -	1 -	4 -	1 0	0 -	0 -	0 -	0 1	7 1	4 -	1 -	12 1
Purple Martin	<1% FS	0	0	2	0	0	0	0	0	2	3	1	6

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Wildlife Species	Estimated % Habitat on BLM/FS Surveyed	South Chetco	North Chetco	North-west Coast	Fish Hook/ Galice	Taylor	Briggs	West IV	East IV/ Williams/ Deer	Total All LSRs	Non-Matrix Other than LSR, No Program Harvest	In Matrix	Total
	<1%BLM	-	-	-	0	-	-	-	1	1	-	-	1
Bank Swallow	<1% FS	0	0	0	0	0	0	0	0	0	0	0	0
	<1%BLM	-	-	-	0	-	-	-	0	0	0	-	0
Western Bluebird	<1% FS	1	0	3	5	2	0	0	0	11	11	6	28
	<1%BLM	-	-	-	0	-	-	-	2	2	-	-	2
Olive-sided Flycatcher	<1% FS <1%BLM	Data for individual LSRs not available at this time											0
Brazilian Free-tailed bat	<1% FS <1%BLM	Data for individual LSRs not available at this time											0
Yuma Myotis	<1% FS	1	0	0	0	0	0	0	0	1	0	0	1
	<1%BLM	-	-	-	1	-	-	-	1	2	-	-	2
Western Gray Squirrel	<1% FS <1%BLM	Data for individual LSRs not available at this time											many
Ringtail	<1% FS	6	2	14	14	7	3	0	0	46	16	6	68
	<1%BLM	-	-	-	10	-	-	-	0	10	-	-	10

***** = Species dependent on Late-Successional Forest

1/ Peregrine: k = Known Site; p = Potential or Suspected.

2/ These spotted owl activity centers are not actually in Matrix; they are LSRs termed "Known Spotted Owl Activity Centers" (ROD page C-10) and surrounded by Matrix.

3/ Marbled murrelet detections in Fishhook LSR are located on the border with the Northwest Coast LSR.

4/ Marbled murrelet Presence indicates detections of "flyby" behavior.

5/ Marbled murrelet Occupancy indicates behavior(s) detected which indicate nesting.

6/ White-footed Vole. We have no sightings for this species, which is thought to depend on alder riparian zones. Wildlife Biologists look for habitat, rather than individual voles.

7/ Great Gray Owl. This species is thought to be only "accidental" in the area covered by this LSR analysis.

8/ NW Pond Turtle. Our only native turtle is found along rivers, especially in the various Wild and Scenic Rivers in the area.

9/ Siskiyou Mountain Salamander. The divide between the Rogue River National Forest (Applegate drainage) and the Siskiyou National Forest (Illinois River drainage) appears to also be the dividing line between the ranges of the Siskiyou Mountain salamander (east) and Del Norte salamander (west).
10/ These insect species are known only from their initial collection areas.
11/ These are the species identified for "additional analysis," based on the screening process described on pages J2-2 and J2-3 of Appendix J2 of the Northwest Forest Plan (Results of Additional Species Analysis).
12/ The black-backed woodpecker is "rare" in the Oregon Klamath Mountains. May even be "accidental."
13/ From J2: The common merganser is a widely distributed, common waterfowl species is closely associated with streams and rivers on federal forest lands for breeding.
14/ Osprey sightings represent nesting birds, and the Forest Service data base contains multiple data points for many nesting birds, often over a period of years. Most of the osprey activity is concentrated along the Forest's Wild and Scenic Rivers. In any given year, some 50 nests may be active on the Siskiyou National Forest and adjacent BLM lands. On lands managed by BLM and dealt with in this LSR analysis, 75 percent of the habitat has been surveyed; much of the osprey activity takes place just outside of the Galice LSR, along the Rogue Wild and Scenic River.
15/ Woodpeckers: 2.6 snags per acre is 100% habitat capability level (Brown 1985).
16/ Roosevelt Elk. Although sightings are opportunistic, sightings illustrate most observations have occurred in areas with no programmed timber harvest. In the future, pioneer vegetation will be in short supply in these areas. No mitigation is possible or should be necessary. FEMAT rating 100-0-0-0.

Table 6. Habitat acreage and species sites within the federal lands in the assessment area. Relative condition of habitat for the spotted owl and marbled murrelet is described. "No Programmed Timber Harvest" includes Congressionally Reserved, LSR, Riparian Reserves, and Administratively Withdrawn (Management Areas 1 through 11).

	Grand Total	Areas With No Programmed Timber Harvest (%)	Areas With Programmed (Matrix) Timber Harvest (%)
1-Total Acreage w/in Boundary of Assessment Area	1,304,000	1,137,000 (87)	167,000 (13)
2-Acreage Federal Land w/in Boundary of Assessment Area	1,235, 000	1,137,000 (92)	98,000 (8)
3-Total Spotted Owl Habitat Capable Acres 1/	797,896	653,678 (86)	104,218 (14)
4-Total Suitable Spotted Owl Habitat 2/	383,000	340,000 (89)	43,000 (11)
5-Spotted Owl Sites 3/ 4/	208	178 (86)	30 (14)
6-Spotted Owl Sites (≥50%)	89	Row 5 is based on 1995 data. Rows 6 thru 8 are based on 0.5 mile circles. Owl sites for National Forest land only.	
7-Spotted Owl Sites (16-49%)	87		
8-Spotted Owl Sites (≤15%)	11		
9-Total Marbled Murrelet-Capable Acres 1/	797,896	653,678 (86)	104,218 (14)
10-Total Marbled Murrelet Suitable Habitat 2/	383,000	340,000 (89)	43,000 (11)
11-Total Occupied Marbled Murrelet Sites 5/	149	149	0
12-Total Documented Presence of Marbled Murrelets (not including Occupied Sites) 5/	563	Most of the sites are located in areas with no programmed timber harvest	

1/ Based on PMR data (all land is "capable" unless classified as water, rock, snow, grass, shrub, or serpentine [the latter type might be late or climax, but actually less than 40% canopy closure]). Assume capable acres for marbled murrelet same as for spotted owl (actually is less, but how much less is unknown).

2/ Based on PMR data (Mid, Late, and Climax seral stages, at >40% canopy closure). > 40% canopy closure was used as the "lower end" for late-successional habitat, instead of > 70%, because most natural stands between 40% and 70% are actually are close to 60%, and therefore do qualify as late-successional habitat (ecoplot data for the Siskiyou shows old-growth at 60% or more canopy closure). Natural stands < 40% are typically on serpentine-influenced soils and do not qualify as late-successional. Within the survey area for marbled murrelets, we assumed suitable acres for marbled murrelet is the same as for spotted owl (actually is less, but how much less is unknown). Murrelets are only known to occur to the eastern edge of the Hemlock/Tanoak zone (15 to 32 miles from the ocean).

3/ Occupancy and reproduction are expected to continue at a normal level in spotted owl home ranges that contain 50 percent or more suitable habitat. Diminished occupancy and reproduction rates are expected for home ranges that contain 16 to 49 percent suitable habitat. Occupancy and reproduction may cease for home ranges that contain 15 percent or less suitable habitat. Does not include 5 owl activity centers from Coos Bay District BLM situated in LSR just beyond the boundary of the Siskiyou NF.

4/ Based on data through 1993. The 30 owl sites listed as in the Matrix are all protected by 100 acre LSRs ("Known Spotted Owl Activity Centers" - ROD page C-10).

5/ Based on data through 2000. "Sites" equal "presence" or "occupancy" results of individual survey visits. Some "sites" are close together (less than one mile apart). When an occupied site is found in Matrix or other non-protected allocations, the site re-allocated to LSR status

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Table 7. Late Successional Reserves on the Siskiyou National Forest (plus 140,000 acres Bureau of Land Management LSR adjacent to East IV and Fish Hook, and small areas north of Northwest Coast and west of South Chetco). Map 1 shows locations of individual LSRs. Data on Owl Activity Centers up through 1993. 50%+suit = Spotted owl home ranges which contain at least 50 percent of the area in late successional forest (at least 252 acres out of 503 acres, based on 0.5 mile radius from activity center); any action which reduces the late successional habitat in a home range to less than 1,360 acres results in "incidental take." For home ranges below 50 percent, vegetation manipulation projects designed to increase the amount of successional habitat are high priority (the lower the percent, the higher the priority). Does not include information on 5 owl activity centers from Coos Bay District BLM situated in LSR just beyond the boundary of the Siskiyou NF.

				# Spotted Owl pairs on Federal land (NF, BLM)			
LSR Name	BLM/NF Acres in LSR	Areas with Potential Acres (%) 1/	Existing Late-Successional Acres (%) 2/ 3/	≤15% suit	16-49% suit	≥50% suit	TOTAL Owl Pairs
S. Chetco	71,382	67,684 (95)	30,028 (36)	1	14 NF + 1 BLM	13	29
N. Chetco	28,199	26,476 (94)	8,886 (29)	0	7	2	9
NW Coast	145,974	139,180 (95)	70,598 (38)	1	13 NF + 4 BLM	27 NF	45
Fish Hook	151,965	217,826 (93)	60,454 (39)	1	12	16	29
Galice BLM	82,895		40,994 (60)	0	3	26	29
Taylor	8,934	8,420 (94)	4,912 (46)	0	2	1	3
Briggs	53,980	35,785 (66)	14,307 (50)	2	4	3	9
West IV	53,738	11,558 (22)	2,022 (29)	0	2	0	2
East IV	62,809	107,320 (88)	28,202 (36)	0	9	14	23
Williams BLM	59,717		23,859 (47)	10	5	8	23
TOTAL	719,593	614,249 (85)	284,262 (46)	15	76	108	199
Owls Protected in other Land Allocations with no Programmed Harvest				10	0	1	11
Known Spotted Owl Activity Centers (100 acre LSRs from "Matrix")							24
GRAND TOTAL							208

1/ Area left after serpentine, meadows, rock, water, and grass have been removed.
2/ Areas with Late Successional characteristics that include Late or Climax seral stages with 40% canopy closure - "Late" equals trees with at least 21 inch DBH (PMR satellite data). Percent figures in this column are "percent of the percent" in column 3.
3/ Areas close to having Late Successional characteristics; includes the Mid, Late, and Climax seral stages with > 40% canopy closure (PMR satellite data). Figures in this column are "percent of the percent" in column 3, and include the area from column 4.

Table 8. Spotted owl Critical Habitat overlap with LSR for federal lands in the assessment area. Percent CHU covered by LSR is 83; other land allocations with no programmed timber harvest, such as Wild and Scenic River corridors, also act to insure that Critical Habitat will continue its vital role in maintenance of spotted owl populations. Taylor Creek LSR is not associated with any CHU acres, and is not listed in the table.

CHU NUMBER	FS or BLM Acres In CHU	LSR NAME	FS or BLM Acres In LSR	FS or BLM Acres CHU In LSR (%)	FS or BLM Acres CHU outside Of LSR (%)
OR-65 FS	3,552	Fish Hook	151,595	3,552 (100)	0 (0)
OR-65 BLM	73,080	Galice	82,895	47,480 (65)	25,600 (35)
OR-66 FS	7,812	NW Coast	145,974	7,667 (98)	145 (2)
OR-67		FS NW Coast	145,974	[49,998]	
OR-67		FS Fish Hook	151,965	[17,530]	
Summary OR-67	79,761			67,528 (85)	12,233 (15)
OR-68 FS	13,282	Fish Hook	151,965	11,544 (87)	1,738 (13)
OR-69 FS	26,616	Fish Hook	151,965	24,280 (91)	2,336 (9)
OR-70 FS		Briggs	53,980	[27,854]	
OR-70 FS		West IV	53,738	[305]	
Summary OR-70	36,943			28,159 (76)	8,784 (24)
OR-71 FS	53,784	South Chetco	71,382	51,200 (95)	2,584 (5)
OR-72 FS	10,092	East IV	6,280	94,393 (44)	5,699 (56)
OR-72 BLM	45,988	Williams	59,717	45,988 (100)	0 (0)
OR-73 FS	10,575	East IV	62,809	8,820 (83)	1,755 (17)
GRAND TOTAL	361,485	N/A	719,593	300,611 (83)	60,874 (17)

Map 4. Critical Habitat Units (CHU) in Late Successional Reserves (LSR)

D. Unique Habitats

Unique habitats existing in each LSR are described in Table 9 with locations in map 5. Most of the habitats listed in Table 9 are "Special Wildlife Sites," as described in the 1989 Land and Resource Management Plan for the Siskiyou National Forest. Meadows less than one acre and much of the White Oak/Black Oak Savannah were not mapped as MA-9 in the Siskiyou LRMP. Also, a few unique sites of various types have been found since 1989; these proposed sites will be added to the Management Area 9 allocation at a future date (Forest Plan Amendment). The discussion below applies to all Siskiyou unique habitats (existing MA-9 allocations and those sites to be added in the future). Acres for existing sites listed below do not match exactly with 1989 LRMP totals because LRMP acres were estimated from computer maps; these sites were later mapped more accurately in GIS). Botanical sites are also part of the MA-9 strategy, and are discussed in this document in the section A above (Special Status Plants).

The Medford District of the Bureau of Land Management does not have a similar land allocation, although many of these unique habitat sites are present on the LSRs they manage. As described below, maintenance of some unique habitats requires active management of vegetation; this vegetation would be other than late successional. Management techniques listed below for maintenance and enhancement of these habitats apply to LSRs managed by both the Forest Service and BLM. Together or separately, these unique habitat types add substantial diversity to the mix of wildlife habitats in the LSRs.

On page C-17 of the Northwest Forest Plan, mention is made that "habitat improvement projects designed to improve conditions for … wildlife … should be considered if ... their effect on late-successional species is negligible." Maintenance of Wildlife Areas, BLM Elk Areas, and existing meadows (including Oak Savannah), plus reclamation of lost meadows would reduce the amount of potential late-successional forest in LSRs. Approximately 19,000 acres of these Unique Habitats exist in LSRs, and would not actually be maintained as late-successional habitat (these sites would provide a modicum of early-successional habitat interspersed throughout the LSRs in the assessment area). Due to poor soil and other conditions, an estimated 50 percent or more of the 19,000 acres in these habitat types would never produce quality late-successional forest habitat. Thus, the potential "loss" (or "non-gain") of late-successional habitat in LSRs on federal lands in the assessment area is trivial and constitutes approximately 1.3 to 2.7 percent of the land base. Maintaining the viability of these habitat types has and would have little effect on late-successional species inhabiting LSRs on federal lands in the assessment area. Maintenance of these habitat types does have an important positive impact: perpetuation of these wildlife habitats (and their attendant significant contribution to biological diversity).

Wildlife Areas. These are high value sites with multiple values for wildlife (for example, a Wildlife Area may contain water, meadow, and hardwoods). Sites range from larger areas such as Horse Creek (Matrix), Pebble Hill (LSR), Morris Rogers (LSR and W&S River), and Fish Hook (mostly LSR with some Matrix), to smaller areas such as Pony Keg and Cedar Swamp (both LSR). Sixty-one percent of the acres in Wildlife Areas in the entire assessment area are contained within LSRs; total area of Wildlife Areas in LSR on National Forest is 3,398 acres (for the entire Siskiyou National Forest (including Matrix) total acres in this allocation are 5,542). Those Wildlife Areas in LSR on the federal lands in the assessment area should be managed to maintain or improve their value to wildlife; portions of some of these areas may be managed for other than late successional forest. Individual management plans may be developed for the more complex sites (such as Fish Hook).

Meadows <1 Acre - Not Mapped. For the federal lands in the assessment area, small openings of less than one acre were not mapped (not included as a land allocation in the Siskiyou's MA-9). For the Siskiyou, these sites were discussed as part of the Forest-wide Standards and Guidelines (Siskiyou LRMP S&Gs, pg IV-36). Small meadows and other small openings of less than one acre contribute to vegetative diversity, and are important to many wildlife species; they provide forage sites for deer and elk within optimal thermal cover and are especially important during severe weather (Brown 1985). Those meadows of less than one acre in LSR on the federal lands in the assessment area should be managed to maintain or improve their value to wildlife.

Meadows >1 Acre - Forest Service, Mapped -- BLM, Unmapped. This habitat type is an important integral component of overall habitat diversity on the federal lands in the assessment area. Meadows and meadow/forest edge areas provide hiding and thermal cover, nest and den trees, and food for many wildlife species. Perhaps the best-known meadow complex in LSR is Adams Prairie, which provides excellent habitat for a variety of species, from torrent salamanders and water pipits to golden eagles and coyotes. Several important meadows are located on BLM lands; examples are the large meadows on the slopes northeast of Marial.

Post Fire Condition for Wildlife Areas and Meadows, including Black/White Oak Savannah.

The Biscuit Fire affected two Wildlife Areas. These sites are Trail Canyon and Fishhook. The Fishhook Wildlife Areas contain a meadow component (see below).

Fifty-six meadows were located within the Fire area (Table 8a). In general, fire is beneficial to this type of habitat; prescribed fire is frequently used as a tool to deal with encroaching vegetation. Several "pine" meadows (pine/oak savannah - serpentine-influenced soils) are presently being encroached by Douglas-fir, due to fire suppression.

Many meadows, including serpentine and oak savannah sites, were rejuvenated in the fire area; encroachment at many sites was pushed back, and older stands were set back to the pioneer stage; populations of deer and elk, and other species which make use of openings, will increase.

Table 8a. Meadows and Wildlife Areas within the Biscuit Fire Perimeter

Name	Polygon ID (or MA-9 Meadow #)	Legal Location			Acres
		Township	Range	Section	
MEADOWS					
Seven mile	0057	35	12	36	212
Fairview Meadow	0074	37	12.5	34 N	76
Fairview Elk Corridor	0075	37	12	19 NW	39
Megs Meadow	0076	37	12	19	24
Burnt Ridge/Sugarloaf	0086	35	1	7	63
Sugarloaf #1	0085	34	10	6 N	64
Indigo Prairie	0089	35	10.5	19	65
Long Ridge Meadow	0112	38	12	23, 27	273
Nook Prairie	0113	38	12	23, 26	55
Quail Prairie	0114	38	11	30 NW	25
Red Mtn. Prairie	0119	39	11	8, 17	64
Mislatnah Meadow	0139	38	1	1, 12	36
Dasher	0147	37	9	4	22
Onion Camp	0158	38	9	30 NE	8
Foster Mine	0161	37	9	29 SE	18
Franz Meadow	0166	40	10	14	6
	0272	35	11	32 NE	20
	0273	35	11	31 NE	27
	0274	35	11	34 W	21
	0340	35	10.5	9 NE	12
	0433	38	8	7 Center	7
	0462	38	9	2 NWNW	6
Briggs Ranch	0464	36	11	4 Center	113
Silver Prairie	0472	36	11	10 NE	47
Silver Prairie	0473	36	11	10, 11	232
	0481	35	10	33 NE	21
Wilderness	0484	36	11	21 E	74
Wilderness	0487	36	11	26, 27	71
Wilderness	0488	36	11	26	19
Wilderness	0489	36	11	25	4

Table 8a. Meadows and Wildlife Areas within the Biscuit Fire Perimeter					
Name	Polygon ID (or MA-9 Meadow #)	**Legal Location**			Acres
		Township	Range	Section	
Bald Mtn, Part in Wilderness	0490	36	10	17, 18	135
Wilderness	0491	36	11	34 Center	8
Pine Flat, Wilde	0563	36	10	34 NW	57
Lange Ranch, most private	0577	37	9	33 Center	2
Near McCaleb Rnc	0579	38	10	3 NW	5
Snow Camp Mdw	0626	37	12.5	24, 25	39
Windy Valley	0629	37	12	321	45
Meadow Crk Mdw	0630	37	12.5	36 SW	60
Fry Place, Private	0638	36	12	3	34
Wilderness	0651	36	11	32, 33	38
High Prairie Part Private	0658	38	12	3, 10	121
The Pines	0659	38	12	2, 11, 12	192
	0661	38	12	12	31
	0662	38	12	1 SW	23
	0666	38	12	12 E	35
Lately Prairie Wilderness	0670	38	11	8 W	26
Part private	0716	38	12	24 Center	42
Oak flat, part private	0946	37	9	7, 8	49
Proposed MA-9	1038	Chetco			127
Proposed MA-9	1088	Chetco			8
Proposed MA-9	1092	IV			6
Proposed MA-9	1101	Chetco			17
Proposed MA-9 Burnt Ridge	2070	34	10	31	4
Proposed MA-9 Wilderness Klondike	3105	IV			32
Proposed MA-9 Canyon Creek	4009	39	9	10	4
Proposed MA-9 Fiddler Mtn	4010	38	9	27	5
Proposed MA-9 Oak flat, private	4102	IV			8
Proposed MA-9 Soldier Creek	4103	IV			10
TOTAL	59 Sites				2,887
WILDLIFE AREAS					
Fishhook	0336	5	10	8	1,065
TOTAL	1				1,065
Grand TOTAL	60 sites				3,952

Map 5: Southwest Oregon Special Wildlife and Plant Sites

Fifty-seven percent of the meadow acres in the assessment area are contained within LSRs. LSRs contain 6,934 acres of meadow habitat (6,534 NF, 400 BLM) (for the entire Siskiyou National Forest, 11,462 acres are allocated to meadows). Those meadows in LSR on federal lands in the assessment area should be managed to maintain or improve their value to wildlife; except for buffer strips of meadow/forest edge habitat, meadows should be managed for other than late successional forest. Individual management plans may be developed for the more complex sites (such as Adams Prairie).

Meadow areas lost to encroachment should be restored to their former size. Aerial photographs were taken circa 1940 of most of the Siskiyou, and portions of adjacent BLM LSRs. These photographs provide a historical reference point -a guide to size and shape of meadow habitat in federal lands in the assessment area, before the advent of widespread fire suppression. In some cases, these 55 year old photos are a window to even earlier times (perhaps back to the World War I era); some of the photos show encroachment which had occurred in meadows during the previous several decades prior to 1940.

Although many of the meadows on federal lands in the assessment area could be planted to and would grow trees, doing so would severely reduce the acres devoted to this unique habitat type. Approximately nine-tenths of one percent of the acres in LSRs in the assessment area is presently devoted to meadow habitat. Perhaps 50% of these areas are not capable of growing late-successional forest. Even if meadow acres lost to encroachment are recovered (maximum estimate is equal to the number of existing acres -- 100 % increase), less than two percent of the acres in LSRs in the assessment area would be "allocated" to meadow. The Northwest Forest Plan mentions meadows directly or indirectly in several instances. One of the nine Aquatic Conservation Strategy Objectives on page B-11 of the ROD speaks to maintaining and restoring the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands; some of the meadows contained within federal lands in the assessment area are located in these situations. Under a discussion of Watershed Restoration (ROD, page B-31), acknowledgment is made that opportunities exist for meadow restoration projects.

Black/White Oak Savannah. Although Oak Savannah was not specifically mapped as a habitat type within land allocation MA-9 as part of the Siskiyou's 1989 LRMP, this important habitat type is an integral component of overall habitat diversity on federal lands in the assessment area. Most, but not all of the Oak Savannah sites were mapped as Meadows (see above); some sites were missed when mapping was done from aerial photographs, because slowly invading conifers had obscured the true origins of the sites. A maximum (estimated) 2,000 acres of Oak Savannah may have been missed during the MA-9 mapping efforts in the 1980s (not mapped as Meadow or Wildlife Area); most of these acres are in LSRs.

Oak Savannahs and savannah/forest edge areas provide hiding and thermal cover, nest and den trees, and food for many wildlife species, including deer, elk, wild turkeys, and a variety of songbirds. Perhaps the best-known Oak Savannah complex is located on some of the south-facing slopes near the mouth of Shasta Costa Creek, in the Fish Hook/Galice LSR. Some of the Oak Savannah habitat sites in this area have been mapped as part of the Siskiyou's Meadow sites (see above). Oak Savannah sites in the lower Shasta Costa drainage mapped in GIS as existing meadows (MA-9) include sites 255, 252, 043, 3068, 251, 323, 324, and 322. Approximately 400 acres of Oak Savannah in this general area have NOT been mapped as existing MA-9 allocations (Sections 3, 4, 5 - T35S, R11W and Sections 32, 33 - T34S, R11W).

Within LSRs on the Siskiyou, other Oak Savannahs presently mapped as Meadows include Fall Creek 265 and 264, Oak Flat 053, Big Bend area (Rogue River near Illahe) 0032, 3068, 243, 031, 240; and Sapphire 3069. Several "pine" meadows (pine/oak savannah - serpentine-influenced soils) are presently being encroached by Douglas-fir, due to fire suppression. In their pine/oak condition, these sites provide excellent habitat for a variety of small and large animals, including many woodpeckers (Pine Grove 055, Pebble Hill 058, Sevenmile 57, Wildlife Area 277).

The fire suppression efforts which have endured over the last six or more decades should be ended; prescribed fire is needed to maintain these Oak and Pine/Oak Savannah areas (conifers which invaded 50 to 60 years ago need to be removed). Use of prescribed fire, besides maintaining an important habitat and plant community type, would also reduce long-term fire risk for the Agness community.

Lakes/Ponds. These high value habitat sites have been mapped in five of the eight LSRs discussed in this assessment. Sixty percent of the acres in Lakes/Ponds in the entire assessment area are contained within LSRs; total area of Lakes/Ponds in LSR on National Forest is 291 acres (for the entire Siskiyou National Forest total acres in this allocation are 481). Those Lakes/Ponds in LSR on the federal lands in the assessment area should be managed to maintain or improve their value to wildlife; although vegetation at these sites is generally best managed as late successional habitat, there may be instances when vegetation at some of these areas may be more appropriately managed for other than late-successional forest.

Swamps/Springs/Wet Areas. These high value habitat sites have been mapped in two of the eight LSRs discussed in this assessment. Eighty-one percent of the acres in Swamps/Springs/Wet Areas in the entire assessment area are contained within LSRs; total area of Swamps/Springs/Wet Areas in LSR on National Forest is 104 acres (for the entire Siskiyou National Forest total acres in this allocation are 128). Those Swamps/Springs/Wet Areas in LSR on the federal lands in the assessment area should be managed to maintain or improve their value to wildlife; although vegetation at these sites is generally best managed as late-successional habitat, there may be instances when vegetation at some of these areas may be more appropriately managed for other than late-successional forest.

Rock (talus/bluffs/etc.). These high value habitat sites are scattered across the federal lands in the assessment area. Rock sites, including adjacent forested areas (edge) are important habitat for a number of species of special concern, both plant and animal, including the western big-eared bat and Del Norte salamander. Thirty-nine percent of the acres in Rock Sites in the entire assessment area are contained within LSRs; total area of Rock Sites in LSR on National Forest is 5,787 acres, or about eight-tenths of one percent of the LSR land base (for the entire Siskiyou National Forest total acres in this allocation are 14,784). Those Rock Sites in LSR on the federal lands in the assessment area should be managed to maintain or improve their value to wildlife. When vegetation is present at these sites, it is generally best managed as late-successional habitat; however, there may be instances when vegetation at some of these sites may be more appropriately managed for other than late-successional forest. Use Brown (1985) – Chapter 9 - Cliffs, Caves, Talus – as a guide in managing rock sites.

Band-tailed Pigeon. These uncommon but important habitat sites (key feeding, roosting, mineral springs, and "fly through" areas) are present in two of the LSRs in the assessment area; these sites receive concentrated use by band-tailed pigeons. Thirty percent of the acres in Band-tailed Pigeon Sites in the entire assessment area are contained within LSRs; total area of Band-tailed Pigeon Sites in LSR on National Forest is 234 acres (for the entire Siskiyou National Forest total acres in this allocation are 766). Those Band-tailed Pigeon Sites in LSR on the federal lands in the assessment area should be managed to maintain or improve their value to wildlife. To maintain its value to band-tailed pigeons, vegetation at these sites should be managed as "other than" late-successional habitat (generally managed in food-producing small tree or shrub-type vegetation.

Large-Growth Tanoak. On the Siskiyou National Forest, four Tanoak sites totaling 360 acres have been identified as important forage areas for wildlife, especially deer, bear, and elk. These mature tanoak stands produce outstanding acorn crops year after year. All four sites are located in the Northwest Coast and Fish Hook LSRs (no sites in non-LSR). These sites should be maintained in their present condition, and protected from stand-replacement fires.

Viable seed is borne in abundance after 30-40 years. Mature trees (>30") produced the most acorns. Although, 5-year old sprouts also produce fairly heavy crops (Silvics of North America. Agriculture Handbook).

Hardwoods and Dispersed Habitat (i.e., Dispersed Old-growth) are described in the Siskiyou LRMP (pgs IV-113, 114) as mostly mature and old-growth forest; they were designed as random "stepping stones" between habitat areas for pine marten, pileated woodpecker, and spotted owls. The habitat networks for these three species were superseded by the LSR land allocation in the Northwest Forest Plan. Many of these sites were located on lands unsuitable for timber harvest, because of geology or soils problems. It is appropriate to continue to manage Hardwoods and Dispersed Habitat as late-successional habitat. Acres within LSR for these two habitat sites are: Hardwoods 1,884; Dispersed Habitat 13,312.

Elk Areas. Elk make greater use of certain forest habitats during the course of their daily and seasonal activities. Special sites such as riparian zones, natural openings, calving areas, and specific old-growth stands meet important elk habitat needs. On the Siskiyou National Forest in the Northwest Coast LSR, six Elk Areas totaling 615 acres have been identified as important travel corridors and calving areas. Approximately 200 acres of important elk habitat areas also exist in the Galice portion of the Fish Hook/Galice LSR. Several marginal or low-productivity sites (in terms of tree production) on ridgetops in the Silver Creek-to-Peavine Mountain area are presently in the grass seral stage, but suffer from encroaching brush and some conifers. These sites range in size from several acres to as many as 20. One of the sites is actually the "easement" area surrounding the Peavine Lookout (trees which would obstruct the view must be removed at periodic intervals).

None of these sites are currently in late-successional condition and invasion of brush and trees has only occurred since the advent of rigorous fire suppression. These sites maintain soil moisture into the summer season, and form an important habitat base for the well-known Peavine elk herd. These ridgetop sites should be maintained or enhanced for their forage values; they would never support quality late-successional forest. Maintenance and enhancement measures include prescribed fire and grass seeding.

Table 9. Unique Wildlife Sites for each LSR, by acres (and sites). Last column is PERCENT ONLY, and shows proportion of sites in/out of National Forest LSR in terms of acres and total sites. Forest Service data mostly from the 1989 LRMP, MA-9. Most of these site types exist on BLM lands also; however, these habitats have not been mapped. Meadow and Elk Area acres for BLM have been estimated. Six Wildlife Areas straddle the boundary between both LSR and other land allocations.

Special Wildlife Sites	Total Acres (Sites) in LSR	South Chetco	North Chetco	Northwest Coast	Fish Hook/Galice	Taylor	Briggs	West IV	EastIV/-Williams-/Deer	In other than LSR	Percent in Acres (Sites) All LSRs/OtherLands
Wildlife Areas NF	3396 (13)			1522 (7)	1876 (6)					2,144 (14)	61(48)/39 (52)
Meadows <1 ac NF	Not Mapped see SIS LRMP S&G's pg IV-36										
Meadows>1 ac NF	6534 (186)	113 (10)	438 (18)	2138 (59)	2335 (59)	117 (2)	49 (5)	6 (1)	1,338 (36)	4,928 (99)	57 (65)/43 (35)
Meadows >1 ac BLM	400 (N/A)				200ac				200ac		N/A
Black/White Oak Savannah	Est 2000				400ac				?	?	N/A
Lakes/Ponds NF	291 (35)		10 (3)	125 (11)	64 (8)		9 (3)		83 (10)	190 (23)	60 (60)/40 (40)
Swamps/Springs/Wet Areas NF	104 (8)	3(1)		101 (7)						24 (4)	81 (67)/19 (33)
Rock (talus/bluff/etc) NF	5,787 (254)	101 (2)	63 (1)	338 (34)	1910 (88)	141 (3)	1594 (70)	383 (12)	1257 (44)	8,997 (167)	39 (61)/
Band-tailed Pigeon NF	234 (4)				169 (2)				65 (2)	532 (3)	30 (57)/70 (43)
Tanoak NF	360 (4)			176 (3)	184 (1)					0	360 (100).0 (0)
Hardwoods NF	1,884 (36)	544 (1)	552 (8)	116 (6)	412 (15)		19(1)		241(5)	327 (7)	83 (84)/17 (16)
Dispersed Habitat NF	13,312 (242)	1163(17)	727 (7)	1875 (52)	4479 (55)		2453 (35)	972 (20)	1643(56)	5,797 (79)	70 (75)/30 (25)
Elk Areas NF	615 (6)			615 (6)						122 (1)	83 (86)/17 (14)
Elk Areas BLM	200 (N/A)				200ac				0 Ac		N/A

E. Fish Species with Special Status

Fish Species of Concern - The lakes, river, and streams within the Fire perimeter support a variety of fish species, including five salmonid species. For a complete fish species list, see "Fish Species Present" in Appendix F. More than 462 miles of salmonid habitat lie within the analysis area. Map III-8: Fish Habitat Distribution (located at the end of Chapter III) depicts known and suspected fish distributions. Because of

their special management status, this analysis focuses on Coho salmon, Chinook salmon, steelhead trout, coastal cutthroat trout and Pacific lamprey.

Coho salmon are classified as Threatened under the Endangered Species Act due to substantial declines in their habitat and population. Critical habitat has been designated for coho salmon. Because the population is too low to accurately determine distribution within all stream drainages, its distribution is assumed to be similar to that of steelhead trout, for which adequate records exist. For the purpose of this study, critical habitat coincides with the distribution of steelhead trout. Essential elements of this habitat (Essential Fish Habitat or EFH), some 255 miles within the fire perimeter, are protected under the Magnuson-Stevens Act.

Chinook salmon are classified as Management Indicator Species (MIS) and Sensitive Species. MIS receive special management attention in the Siskiyou National Forest Land and Resource Management Plan (Forest Plan) because of their important as a sport fish and sensitivity to management activities. Sensitive Species are identified by the Regional Forester as species for which population viability is a concern. This is based on evidence of significant current or predicted downward trends in population size or density or capability sufficient to diminish distribution. They are also classified as a Special Status Species by the Bureau of Land Management (BLM). EFH is protected under the Magnuson-Stevens Act. Spring and fall-run Chinook use a total of 122 miles of streams within the Fire perimeter.

Steelhead trout is an MIS and Sensitive Species. Summer and winter-run steelhead use a total of 255 miles of streams.

Coastal cutthroat trout are resident, adfluvial, and anadromous (dividing its life cycle between freshwater and the ocean) and is classified as Sensitive. The resident life form is an MIS. In total, they use 456 miles of stream within the Fire perimeter.

Pacific lamprey is a BLM Special Status Species and has been petitioned for listing under the Endangered Species Act. They are anadromous and the adults migrate to the ocean to parasitize other fish including salmon. The juveniles rear for 4-6 years in freshwater. Although they use a variety of freshwater habitats, they are more common in the low gradient portions of rivers and larger streams. Their distribution within the Fire perimeter is considered to be that of steelhead trout.

All of these salmonids have similar freshwater requirements. For a description of their life history, refer to "General Life History of Anadromous Salmonids- Oregon Coastal Streams" and "General Life History Characteristics of Coho Salmon, Chinook Salmon and Steelhead Trout within the Analysis Area" in Appendix F. Table 9a provides further detail as to the status of assessed salmonids.

Table 9a. Status of fish species			
Species	Evolutionary Significant Unit	Regulatory Status	Regulatory Authority
Coho salmon	Southern Oregon / Northern California	Threatened	Endangered Species Act; Magnuson-Stevens Act
chinook salmon	Southern Oregon / Northern California Coastal	Management Indicator; Sensitive; Special Status	Magnuson-Stevens Act; Forest Service, Region 6; Bureau of Land Management
steelhead trout	Klamath Mountains Province	Management Indicator; Sensitive	Forest Service, Region 6
coastal cutthroat trout (all life forms)	Southern Oregon / California Coasts	Management Indicator (resident life form only); Sensitive	Forest Service, Region 6
Pacific lamprey	Unknown / unidentified	Special Status, Petitioned for listing Jan'03	Endangered Species Act, Bureau of Land Management

V. Historical and Existing Conditions and Processes for the LSRs

UPDATE NOTE: This section has not been reviewed by a Forest Ecologist.

Because terrain, climate, populations, associations, rates of processes, and social and economic needs are constantly changing, historical conditions cannot totally provide a reference for future management standards. Moreover, it is impossible to separate the human influence from "pre-European" historical conditions. Data is lacking and what is available is often unreliable. We can use the recent past, represented by measured data sets, to compare management actions and establish recent process rates. Such estimated baselines provide good data for reference and monitoring.

Describing our future is the most important part of the assessment. We quantify the desired conditions of the late successional reserves. Then, we measure our progress to achieve these conditions with specific reference to recent conditions. Consequently, existing conditions are part of our rationale for future prescriptions. If existing conditions are the same as our desired future, there is no reason to act. However, trends may indicate a risk associated with maintenance. If the risk is not high, again, there may be no reason to act. However, we need to assess any threats to the desired range of conditions.

A. Aquatic Elements and Processes

Several key watersheds are designated within the scope of this LSR Assessment. These were designated under the Northwest Forest Plan as strongholds for anadromous fish or unique potential aquatic and riparian habitat for aquatic and riparian fauna and flora. The LSR allocation is an important complement to the aquatic conservation strategy components: key watersheds, watershed analysis, riparian reserves and watershed restoration. These areas designated as LSR provide additional protection and allow recovery or continuance of watershed functions and processes that affect fish populations in the watershed. Vegetative recovery and maintenance of a resilient riparian and terrestrial forest are integral to protecting and maintaining anadromous and resident fish populations in watersheds. Disturbance from flood, fire and other natural phenomenon will provide materials to stream channels, namely large wood and sediment, to create pulses of new habitats after the disturbance. LSRs will deliver large trees with landslide events to fish habitat.

Low gradient, highly productive stream reaches are important elements of older forests for stream environments. These "flats" have diversity in habitat and are heavily used by fish (Elk Wild and Scenic River Management Plan, DEIS, 1992).

The following tables, maps and graphics serve as a coarse filter for identifying low gradient stream reaches (approximately 50 stream reaches with a length of 100 miles) within or immediately downstream of late successional reserves. The Medford BLM District and the Siskiyou National Forest have stream survey information with information for approximately 400+ miles of streams with fish populations. Additional miles of stream survey information reside on individual databases or spreadsheets at the Ranger District and Area Management Unit level and were not employed for this analysis.

These attributes are common to most of these low gradient reaches:

1. Each reach, greater than one half mile in length, has an overall gradient of two percent or less. A few exceptions are Dunn Creek and Althouse Creek (3%) with higher gradients. These two streams are addressed due to the abundance of both salmon and steelhead.
2. All reaches have populations of resident and anadromous salmonids.
3. Most reaches have stream valleys greater than three bankfull widths or a valley index of 3 or greater. The reach is unconfined by adjacent hillslopes and exhibits lateral channel movement. Most stream reaches are within alluviated canyons or alluvial valleys with floodplains (Frissell 1986).
4. Braiding and some side channel habitat are present. Flood plains and terraces in these reaches often contain diverse hardwood and conifer forests. Forbs and grasses growing on flood deposits and hardwood litter provide rich photosynthetic materials directly to the aquatic environment.
6. These reaches are pool/riffle systems rather than step/pool or cascade systems. Pool habitat occurs at intervals varying from five (5) to nine (9) wetted widths of the channel. Many pools are lateral scour pools.
7. These reaches are usually depositional rather than erosional or transportational and have finer substrate materials e.g. sand, gravel, cobble and contain accumulations of large wood.
8. These stream reaches have the potential of containing sub-reach stream segments of high aquatic productivity or "flats." Flats of rich aquatic diversity and productivity also exist within stream reaches of steeper gradients. In addition, high gradient areas with boulders and pocket pools are very productive rearing areas for juvenile steelhead. These flats have not been identified at this scale of analysis. The enclosed Table 10 contains information on each of these low gradient reaches. Flats with high aquatic production potential are shorter stream segments or sub-reaches of the reaches shown. Figure 9 depicts examples of the amount of large wood and pools per mile in these reaches. The expected range of 25 to 80 pieces of large wood per mile is derived from data analysis of more than 100 stream reaches in the Siskiyou Mountains.

The large wood in existing pools are compared with the desired frequency of pools every seven (7) wetted channel widths. Many of the gradient reaches listed here have valley bottom roads for easy access and have had some stream cleanout activities. This is not sufficient explanation for the low number of large wood pieces in some isolated stream reaches.

Maps 6 to 6b and 7 to 7i depict the general location of these low gradient stream reaches on federal lands in the analysis area. A subset of these stream reaches with plan view maps and a stream profile adds more information. Many of these biologically important areas have not been located specifically. The watershed analysis work now being undertaken as directed by the Northwest Forest Plan will locate these shorter stream segments more accurately.

Table 10: Low Gradient Stream Reaches within LSRs -- Siskiyou National Forest

			Low Gradient Stream Reaches within Late Successional Reserves											
No. on Graph	Stream Name	Watershed Acres	Reach No.	Length (Ft)	Gradient	Valley Width	Valley Form	Substrate Dom/ Subdivsion	Average Wetted Width	6,280 feet/ 7 x Width	Pools/ Mile	Large and Small Wood/ Mile	Fish Species *	Average 7-day High Temperature
1	Collier 93	22,879	1	4,763	2	1	2	Co/Gr	53	14	12	0	Ct, Rb, StW	64
2			3	6,394	2	2	3	Co/Sb	40	19	16	0	Ct, Rb, StW	64
3	Lobster 91	44,180	1	4,215	2	2	8	Gr/Co	33	23	10	16	Ct, Rb, StW, Co, ChF	61
4			3	1,947	2	2	8	Gr/Sa	36	21	3	3	Ct, Rb, StW, Co, ChF	61
5			5	4,308	2	2	8	Gr/Gr	38	20	5	7	Ct, Rb, StW, Co, ChF	61
6	NF Lobster 94	9,904	2	8,465	2	2	3	Gr/Gr	23	33	21	12	Ct, Rb, StW, Co, ChF	58
7			4	3,762	2	2	3	Sa/Gr	24	31	24	20	Ct, Rb, StW, Co, ChF	58
8			5	13,592	2	2	3	Co/Gr	17	44	23	17	Ct, Rb, StW, Co, ChF	58
9	Quosatana 94	16,416	1	11,889	1	2	5	Gr/Gr	27	28	13	4	Ct, Rb, StW, Co, ChF	52
10			3	4,215	2	2	3	Ca/Co	29	28	16	9	Ct, Rb, StW, Co, ChF	52
11	Shasta Costa 94	23,536	1	8,052	2	2	5	Sa/Sa	30	25	23	2	Ct, Rb, StW, Co, ChF	52
12	92 Briggs	41,194	5	10,392	1	1	3	Co/Gr	29	26	17	7	Ct, Rb, StW	68.5
13			6	5,142	1	1	3	Co/Gr	25	30	6	na	Ct, Rb, StW	68.5
14			2	3,341	2	1	3	Co/Gr	36	21	11	25	Ct, Rb, StW, Co, ChF	68.5
15			3	6,619	2	1	3	Co/Gr	26	29	13	2	Ct, Rb, StW, Co, ChF	68.5
16	94 EF Indigo	13,113	2	6,235	1	2	3	Gr/Co	27	28	47	11	Ct, Rb, StW	56
17	94 Silver Creek	51,200	1	2,316	1	1	2	Gr/Co	23	33	18	2	Ct, Rb, StW, ChF	71.7
18			2	8,668	1	1	2	Gr/Co	27	28	16	2	Ct, Rb, StW, ChF	71.7
19			3	3,282	2	1	2	Co/Co	26	29	9	2	Ct, Rb, StW	71.7
20	94 WF Indigo	16,611	1	7,842	2	2	3	Gr/Co	27	28	25	14	Ct, Rb, StW	59
21			2	3,204	2	2	3	Gr/Co	33	23	33	25	Ct, Rb, StW	59
22			3	5,630	2	2	3	Gr/Lb	33	23	19	28	Ct, Rb, StW	59
23	Taylor Creek	17,696	4	2,022	1	2	1	Gr/Sb	32	24	29	81	Ct, Rb, StW, StS, Co	66
24			6	2,622	2	1	3	Co/Co	17	4	14	na	Ct, Rb, StW, StS	66
25	4th of July 94	5,740	1	12,580	2	1	3	Sa/Gr	16	47	20	17	Ct, Rb, StW, ChF	50
26			2	6,581	2	1	3	Sa/Gr	13	58	18	27	Ct, Rb, StW, ChF	50
27	Chrome Creek 94	11,023	1	8,883	2	1	9	Co/Sb	33	23	13	11	Ct, Rb, StW	
28			2	29,390	2	1	9	Gr/Co	28	27	8	1	Ct, Rb, StW	
29	East Winchuck 94	9,002	1	12,291	1	1	2	Sa/Gr	38	20	17	36	Ct, Rb, StW, ChF	59
30			2	27,859	3	1	3	Gr/Co	26	29	19	59	Ct, Rb, StW, ChF	59
31	Emily Creek	8,000	1	9,818	1	2	na	Gr/Co	24	31	13	5	Ct, Rb, StW, ChF	62
32			3	8,686	1	1	3	Co/Sb	26	29	18	1	Ct, Rb, StW	62
33			2	4,701	2	2	3	Co/Sb	26	29	24	2	Ct, Rb, StW, ChF	62
34			4	7,534	2	1	na	Co/Gr	20	38	22	18	Ct, Rb, StW	62
35	N Fork Smith 94	48,805	1	13,221	1	2	4	Co/Gr	38	20	8	0	Ct, Rb, StW, ChF	65
36			2	42,860	2	1	3	Gr/Co	30	25	17	32	Ct, Rb, StW, ChF	65
37	Bald Face Creek		1	17,508	3	1	3	Sb/Co	40	19	10	2	Ct, Rb, StW, StS, ChF	70.5

Table 10: Low Gradient Stream Reaches within LSRs -- Siskiyou National Forest

No. on Graph	Stream Name	Watershed Acres	Low Gradient Stream Reaches within Late Successional Reserves											
			Reach No.	Length (Ft)	Gradient	Valley Width	Valley Form	Substrate Dom/ Subdivsion	Average Wetted Width	6,280 feet/ 7 x Width	Pools/ Mile	Large and Small Wood/ Mile	Fish Species *	Average 7-day High Temperature
38	Wheeler Creek 94	9,085	1	2,117	2	1	3	Gr/Gr	25	30	25	22	Ct, Rb, StW, ChF	
39			2	31,899	2	1	3	Gr/Co	17	44	21	57	Ct, Rb, StW, ChF	
40	93 Dunn	15,500	1	9,734	3	3	9	Co/Gr	24	31	11	9	Ct, Rb, StW, Co	68.5
41			2	9,380	3	1	3	Co/Lb	23	33	17	18	Ct, Rb, StW, Co	68.5
42	93 Grayback Creek	16,508	1	9,833	2	3	4	Co/Co	23	33	6	1	Ct, Rb, StW, Co	63.2
43			4	12,439	2	2	3	Co/Sb	15	50	11	22	Ct, Rb, StW	63.5
44	94 EF Illinois		1	6,424	2	3	7	Co/Sb	39	19	13	1	Ct, Rb, StW, Co	73.4
45			2	3,852	2	2	8	Co/Sb	31	24	10	5	Ct, Rb, StW	73.4
46			3	5,332	2	2	4	Gr/Sb	35	22	37	16	Ct, Rb, StW	73.4
47	Althouse Creek CR	4,175	1	4,343	3	2	3	Co/Sb	18	42	15	6	Ct, Rb, StW, Co	63.4
48	Sucker Creek (ODFW)	54,000	1	535,392	1.5	4	9	Sa/Gr	42	18	4	2	Ct, Rb, StW, Co, ChF	72
49			2(a)	1,320	1.5	3	7	Gr/Co	35	22	3	4	Ct, Rb, StW, Co, ChF	69.7
50			2(b)	256,608	2	2	5	Co/Gr	29	26	6	1	Ct, Rb, StW, Co	65
51			3(a)	81,312	2.5	2	3	Co/Gr	23	33	5	7	Ct, Rb, StW, Co	61.7
52	94 Johnson		1	11,995	1	2	3	Sa/Sb	25	30	20	4	Ct, Rb, StW, ChF	64
53			2	3,480	2	1	3	Sa/Co	19	40	16	41	Ct, Rb, StW, ChF	54
54			3	7,388	2	1	2	Gr/Co	14	54	23	24	Ct, Rb, StW	54
55	94 Rock Creek		1	3,224	8?	1	2	Co/Gr	28	27	110	21	Ct, Rb, StW	68
56			2	3,224	1	2	3	Sa/Gr	26	29	21	11	Ct, Rb, StW, ChF	68
57	94 SF Coquille		1	6,847	1	3	3	Sa/Sb	43	18	11	5	Ct, Rb, StW, ChF	70
58			3	4,710	1	2	4	Co/Sa	41	18	8	3	Ct, Rb, StW, ChF	70
59			4	23,102	1	3	5	Sa/Co	42	18	7	3	Ct, Rb, StW, ChF	70
60			2	8,390	2	2	4	Co/Gr	37	20	11	2	Ct, Rb, StW, ChF	70
61			5	20,673	2	3	5	Co/Sa	35	22	7	7	Ct, Rb, StW, ChF	70
62	94 Sucker Creek		1	8,348	1	1	3	Sa/Co	14	54	18	13	Ct, Rb, StW, ChF	69.7
	TOTALS			1,431,195		101.5 Miles								

Notes

Valley Width Codes 1 = < 100 ft, 2 = 100-300, 3 = 300-600 ft, 4 = > 600 ft

Valley Form Codes: Range is 1 through 10 with 1 being most confined and 10 being a wide stream valley greater than 600 feet in width.

* Ct = Cutthroat trout, Rb = Rainbow trout, StW = Winter steelhead, StS = Summer steelhead, Co = Coho salmon, ChF = Fall Chinook salmon

** Whole number readings are maximum water temperatures taken during stream survey, decimalized average 7-day temp readings are from temperature recording instruments At forest boundary or mouth of creek.

Figure 9: Comparison of Pools and Large Wood Frequency in Selected Stream Reaches

Map 6: Southwest Oregon - Key Watersheds and Anadromous Fish Streams

Map 6a: Key Watersheds and Anadromous Fish Streams - Galice LSR

Map 6b: Key Watersheds and Anadromous Fish Streams - Williams LSR

Map 7a: East Fork Illinois River Watershed - Low Gradient Stream Reaches

Map 7b: Sucker Creek Watershed - Low Gradient Stream Reaches

Map 7c: Winchuck River Watershed - Low Gradient Stream Reaches

Map 7d: Indigo Creek Watershed - Low Gradient Stream Reaches

Map 7e: Lower Rogue Subbasin Watershed - Low Gradient Stream Reaches

Map 7f: Briggs Creek Watershed - Low Gradient Stream Reaches

Map 7g: Johnson Creek Watershed - Low Gradient Stream Reaches

Map 7h: North Fork Smith River Watershed - Low Gradient Stream Reaches

Map 7i: South Fork Coquille River Watershed - Low Gradient Stream Reaches

B. Forest Elements

UPDATE NOTE: This section has not been reviewed by a Forest Ecologist.

These measured forest elements provide a reference point to compare with the desired future range. Differences between the current condition and desired range give insight for appropriate projects. Forest elements are those characteristics of the vegetation that are important for late-successional species. Examples of forest elements are interior late-successional habitat, large trees, snags, large woody material, multistoried canopies, understory trees, canopy gaps, and patchy understories.

General Elements. Table 11 "Current Conditions of Forest Elements" displays the first estimates of several elements associated with older forests. The estimates, developed from ecoplots are specific to the plant associations on the Siskiyou National Forest. An internal report by McCrimmon and Atzet (June 1992) for the Rogue River National Forest plant series provides the density estimates for snags and down wood. These estimates are specific to southern Oregon. Data from local Forest Service and BLM inventories needs to be added and blank spaces filled as the table is periodically revised in an iterative manner. These estimates reflect post 1940 fire control. Before 1940, the average number of acres burned per year on the Siskiyou National Forest was 20,833 acres. After 1940, the average was reduced to 2,772. All older forest characteristics have been affected, yet it would be difficult to glean this human influence from the plot data.

Table 11. Current Conditions of Forest Elements																
PLANT SERIES	**ABCO**		**ABMAS**		**CHLA**		**LIDE3**		**PIJE**		**PIPO**		**PSME**		**TSHE**	
Two Major Tree Species1/	PSME	ABCO	ABMAS	ABCO	PSME	CHLA	PSME	LIDE3	PDE	CADE3	PSME	PIPO	PSME	PILA	PSME	TSHE
BIG TREES																
Biggest Tree Diameter (DBH inches)	50"	37"					45"				38"	45"	38"	48"		
#/ACRE																
Average Tree Diameter (inches)	34	24	25	22	43	31	30/35	9	18	17	27	33	27	32	42	23
Growth Rate Last 10 years (20ths of an Inch)	15	15	17	18	10	10	11	N/A	5	5	11	10	12	14	13	21
Average Age (Years)	185	135	144	129	307	262	189	N/A	194	185	177	164	177	163	226	122
Live Crown Ratio (%)	47	52	43	58	41	49	45	N/A	45	56		38	48	42	46	59
SNAGS																
Average Diameter (DBH - inches)	33	26	25	27	39	23	29	11	16	16	25		25	31	39	18
Height (ft)			46	32	43	51			37	31					55	32
Decay Class2/	2	2	2	3	3	3	3	2	2	2	2		2		3	2
#/Acre	5	5	5	5	1	1	2	2	2	2						
DOWN WOOD																
Average Decay Class2/		3	4	4	3	4	2	4	3	3	3	4	4	4	4	3
Diameter (in)	15	16	13	15	21	15	18	10	9	12	10		10	10	20	24
Pieces/Acre	52	52	52	52					9	9	25	25	25	25		
Average Length per piece (ft)	33	33	32	32	30	30	31	29	16	39	26		26	10	31	67

1/ Regeneration tree species are listed in the Siskiyou LSR Ecoplot Analysis planning records. Various plant series have over 20 different species which regenerate successfully on any given site.

2/ Decay classes are defined in ecoclass inventory Siskiyou National Forest.

The number of large trees, snags, and large woody material varies by the plant series. The plant series that coexist with cooler, wetter climates have larger trees, more snags, and more large woody material. Consequently, the ABCO, ABMAS, CHLA, and TSHE plant series tend to have the larger trees and more dead wood.

The forest elements of interior habitat, canopy layers, understory trees, canopy gaps, and patchy understories are interrelated with each other. For example, a small patch of overstory trees are blown over, producing a canopy gap and subsequently a patchy understory. Eventually, some understory trees become established in the understory and produce a multilayered stand.

Older Forest Patches. Existing patch size and connectivity of late-successional forest habitat varies within each LSR. Large well-connected patches of older forest habitat are desired. Quantifying the desired amount of "large and well connected" is difficult. The Silver Fire of 1987 and the condition of the Grayback/Sucker watershed in 1949 provide historic examples of natural conditions prior to any timber harvest; in these areas fire suppression and other human activities had not affected natural patch sizes and connectivity. Appendix A provides a relative comparison of patch sizes and numbers for interior late-successional habitat existing in LSRs using the 25 by 25 meter resolution data and the baseline conditions in the Silver Fire and Grayback/Sucker areas. For Briggs and Fish Hook LSR, overall sizes and number of patches are similar to natural conditions. For the other LSRs, overall sizes and number of patches are lower than baseline conditions. These latter LSRs are high priority for treatment, to develop large patches of interior late-successional habitat. In addition, certain plant series in each LSR have limited amounts of interior habitat for older forest species. Priorities for treatment are described in Table 17. Potential projects include prescribed fire and thinning of younger stands adjacent to older forest patches to hasten development of late-successional habitat and reduce fuel loads.

C. Forest Processes

UPDATE NOTE: This section has not been reviewed by a Forest Ecologist.

Processes are forces of change. These processes change the distribution and abundance of forest elements. Examples of processes are fire, timber harvest, tree growth, nutrient recycling, and disease and insect epidemics (ROD, pages B2-4).

The condition of our future forests tie to the management of forest processes. Disturbance, the disruption of succession, can maintain ecosystems, biological diversity, and forest resilience. Disturbance regimes vary with the causative agent. Many forest processes interact with each other. For example, forest disturbances recycle nutrients, kill trees, cause other trees to grow faster, and allow other trees to become established. Consequently, this discussion presents these processes as they relate to forest disturbance.

Agents of Disturbance: Forest disturbance is the result of physical or biological agents. Fires, floods, landslides, ice and snow, windstorms, and soil erosion are the most common physical agents. Insects, other animals, people, and pathogens are the most common biotic agents. The most common agent of change on the Siskiyou is fire and therefore the subject of this discussion. However, some insects and disease disturbances are worthy of discussion. *Phytophthora lateralis,* a root fungus that kills Port-Orford-cedar (POC), is an exotic species whose spores are carried by mud and water. It is carried by animals, vehicles, people, and water along streams during wet weather. Although the pathogen is not threatening the species viability of POC, it has the potential to accelerate the death rate of large POC. The locations of *Phytophthora* are on map 8.

Port-Orford-cedar (POC) is present in all LSRs. It has been mapped. However, due to workforce considerations, updated mapping data for POC is not available to the Biscuit Interdisciplinary Team at this time. When this information becomes available, the LSR assessment should be updated to include this information.

Phytophthora lateralis, henceforth *P. lateralis*, the pathogen that causes POC root disease is present in all the LSRs. Like the POC, it too has been mapped and the information is not available to the Biscuit Interdisciplinary team at this time for the reasons previously identified.

There is a contract being developed to remap the POC within the fire area through a combination of ground truthing and air photo interpretation. This contract should be completed by summer of 2004. This will provide a map of POC that survived the Biscuit fire. Again, upon completion, this information should be added to the LSR assessment. Specific updates for individual LSRs are:

Fish Hook/Galice

The Grants Pass Resource Area has developed a plant series map for the resource area. It is accurate and covers some of the area within the LSR. The map has been requested from the BLM but transfer has not occurred due to the same workforce issues previously mentioned. When the information is transferred, it should be added to the maps for the LSR.

The Indigo creek watershed appears to be one of two fifth field analytical watersheds in Oregon that had POC and does not have *P. lateralis*. In the event that this is indeed true, maintaining this condition should be a priority, in order to maintain the ecosystem function of POC and corresponding contributions to bio-diversity.

West Illinois Valley

POC can be a significant component of forest ecosystems on ultramafic soils, particularly in Riparian Reserves. In these locations, the Port-Orford-cedar series is present. POC can also occur in the western white pine series on these soils. Maintaining POC along streams increases the chances for connectivity between non-serpentine areas.

South Chetco

The Smith River National Recreation Area is heavily infested with *P. lateralis*. Access roads leading into the LSR, along with the LSR itself should be sanitized of all POC. This does not mean the wood has to end up at a mill (although that is also acceptable). For example, commercial size material could be used as in channel structure to enhance fish habitat. The main issue is to reduce the potential for importing additional root disease onto the LSR by eliminating POC that occurs in high-risk areas (along roads).

North Chetco

No update.

Taylor

Portions of this LSR are included in the Grants Pass Resource area plant series mapping mentioned above.

Introduced plant species adversely affect the LSRs. The major exotic species are gorse, scotch broom, and purple loosestrife. All three species crowd out native species and change conditions. Gorse grows in thickets and is a definite fire hazard due to its heavy fuels and flammability. Scotch broom has the same characteristics as gorse. The purple loosestrife is rapidly occupying riparian habitat along the Rogue River drainages, displacing cattails and other riparian vegetation.

Pine beetles and tree mortality are always present in the forest. However, with fire suppression increasing the number of stems per acre and subsequent increased moisture stress, the beetles have become epidemic during the past drought. In places, the overstocked understories have competed for moisture with the

overstory component of Ponderosa or Sugar Pine. This drought and competition has left the overstory pine venerable to attack by pine beetles. 100 percent mortality of pines has occurred in these epidemic areas. Areas of extreme susceptibility are on map 9.

Fuels and Vegetation Conditions. All forest vegetation, live or dead, is considered to be potential fuel for a wildland fire. Put another way, forest fuel is any organic material that could contribute to combustion during a fire. The amount of vegetation available for combustion depends on factors such as fuel size, fuel moisture content, and fuel arrangement. In forested areas most of the biomass is contained in tree boles and generally unavailable to burn except where fuels are ideally arranged (Brown and See 1981).

Fuel characteristics are compactness of the fuel bed, fuel loading, horizontal continuity, vertical arrangement, chemical content, size, shape, and moisture content (NWCG 1996). Fuel arrangements, fuel size and fuel loads can significantly affect fire behavior and fire intensity. All of these fuel characteristics or fuel properties were used to develop fuel models (Anderson, 1982). Within these fuel models the fuels have been classified into four general groups – grasses and grass dominated herbaceous fuels, shrubs and brush, timber litter and understory fuels, and slash. When assigning or choosing a fuel model for any particular area, it is necessary to determine or estimate what the primary carrier of a potential fire would be, given the above characteristics.

See Appendix B of the Biscuit Fire Draft EIS for full descriptions and representative photos of the various fuel models within and around the Biscuit Fire area.

Different vegetation types and successional stages equate to different fuel models. These fuel models are used as input to fire behavior prediction models in order to assess fire behavior and associated fire effects. Models allow for accurate, consistent, and repeatable predictions. This allows fire managers to predict fire behavior across a variety of locations. The models used in this document for fire behavior estimation use average moderate, high, and extreme fire danger weather parameters to predict average fire behavior on moderate, high and extreme fire danger days, or 50^{th}, 90^{th}, and 97^{th} percentile conditions (only 50 %, 10%, or 3% of the days within the fire season have higher fire danger ratings, respectively). Table 11a shows fuel models and associated fire behavior found on the Siskiyou National Forest, within the Biscuit Fire area prior to the fire.

Table 11a. Pre-Fire Fuel Models				
Fuel Model	Primary Carrier of Fire	Corresponding Vegetation Type	Flame Length 1/	Spread Rate 2/
1	Cured grass and herbaceous fuels	Grass savannahs & pine/oak savannahs with less than 1/3 timber or shrub cover	4 feet	78 *chains/hr
2	Cured grass, herbaceous fuels, and litter or dead stem wood	Open shrub lands and pine/oak stands that cover 1/3 –2/3 of the area	6 feet	35 *chains/hr
4	Live & dead brush crowns with flammable foliage	Continuous older ceanothus & manzanita brush fields; Oregon chaparral. Mature brush, 6' or taller with heavy dead component	19 feet	75 *chains/hr.
5	Litter cast by brush & the grasses and forbs in the understory	Young, green, resprouting brush with no dead wood; up to 6' tall	4 feet	18 *chains/ hr
6	Brush canopies	Mid seral brush fields; some chaparral, chamise & oak brush types	6 feet	32 *chains/ hr.
8	Compact timber litter layer under short-needle conifer stands; needles, leaves & twigs	Closed canopied timber stands	1 foot	1.6 *chains/hr.
9	Surface litter under hardwood & long needle conifer stands	Closed stands of hardwood and long needle conifers	2.6 feet	7.5 *chains/hr
10	Surface & ground fuels with potential for conifer torching; more dead limb wood	Timber stands with advanced reproduction pockets	4.8 feet	7.9 *chains/hr.
11	Light logging slash	Light pre-commercial slash, manual brushing slash	3.5 feet	6 *chains/hr
12	Medium logging slash	Heavy pre-commercial thinning stands, medium logging slash	8 feet	13 *chains/hr.

1/ & 2/ – Fire Behavior estimates of Flame Length and Spread Rate were derived with the BEHAVE Fire Behavior Prediction Model, using 5 mile per hour wind speed, dead fuel moisture content of 8%, and live fuel moisture content of 100%.

* - 1 chain = 66 feet

A forest stand may consist of several layers of live and dead vegetation in the understory, midstory, and overstory – or surface, ladder, and crown fuels. Surface fuels consist of grasses, shrubs, timber litter, and woody material lying on the ground. Surface fires will burn the low vegetation, woody debris, and litter. Ladder fuels consist of live and dead small trees and shrubs, live and dead tree branches from larger trees, needles vines, mosses, and any other combustible material located between the top of the surface fuels and the crowns of the trees. Crown fuels are suspended above the ground in trees or brush and consist mostly of the live and fine material within the tree or brush canopy (Graham and McCaffrey, 2003).

A previous discussion showed that the elimination of intentional burning by native people and miners by the end of the 1930's corresponded to a dramatic decline in the number of human-caused fires and total acres burned on the Forest per decade. This decline in number of fires and acres burned had a dramatic effect on the vegetation of the Forest. With fewer fires starting, and most fires being extinguished, through effective fire suppression, before they got very large, the condition of the forest vegetation began to change. With more frequent fires, and more of those becoming large fires, significant areas on the Forest were burned repeatedly within relatively short intervals. These intervals between fires are known as historic mean fire return interval and relate to the *historic fire regime* for the different vegetation communities on the Forest.

The term "fire regime" describes fire's role in an ecosystem. Fire regime includes fire frequency, seasonality, intensity, duration and scale (patch size), as well as periodicity or variability. Historical fire regime and average, or mean fire return interval (FRI) can be used to estimate the number of fire cycles or other natural disturbances that have been missed for any given area. However, due to the extreme variability in FRIs over long periods of time they are quite often not represented by a normal distribution, and the median appears to be a more appropriate measure of central tendency (Skinner and Chang 1996). If the assumption is made that the primary factor contributing to a fire cycle being missed is effective fire suppression, and that for southwest Oregon effective fire suppression began around 1940, then at least 62 years had elapsed since the last significant natural disturbance (excluding the 1987 Silver Fire). Fire regime information can also help inform decisions for prioritizing areas for hazardous fuels treatments, silvicultural treatments, and prescribed fire use.

In Frost and Sweeney (2000), their aggregation and synthesis of available information on the fire ecology and fire history of the Klamath –Siskiyou Region found that "in terms of total area, the predominate fire regime was of relatively frequent fires (e.g. mean fire return intervals of 10-50 years) of mostly low and moderate severity, with varying-sized patches of high severity. This fire regime was predominate in the foothills, lower- and mid-montane forests in both western and eastern subregions of the Klamath Mountains and the Jeffrey pine type on ultramafic soils." It is also important to remember that these local historic fire regimes have been and continue to be quite variable in terms of frequency, severity and spatial pattern or extent, and this variability was possibly equally or more important than the mean or median fire return intervals in creating the vegetation mosaics that exist across the landscape.

Five fire regime groups or classes have been identified to aid fire management analysis efforts, and are currently in use by the Federal Wildland Fire Agencies (Schmidt et al. 2000) (Table 11b). They reflect fire return intervals and severity.

Table 11b. Historic Natural Fire Regime Groups

Fire Regime Group	Description
I	Less than 35 year return interval, low severity, usually non-lethal.
II	Less than 35-year return interval, stand replacement severity.
III	35 – 100 year return interval, mixed severity.
IV	100 – 200 year return interval, stand replacement severity.
V	200+ year return interval, stand replacement severity.

These five fire regimes developed by Hardy, et al. (1999) were modified and further stratified by a group of fire managers and ecologists on October 10, 2000, to reflect the Pacific Northwest (Oregon & Washington) conditions (see Appendix B of the Biscuit Fire Draft EIS). For southwestern Oregon, spatial data layers were developed to display these fire regimes using the Draft Plant Series data that was developed in 1995 for the Southwest Oregon LSR Assessment. This is a work in progress and will be further refined by the area ecology group using Plant Association Groups.

Table 11c lists the fire regimes adopted for this local modeling effort:

Table 11c. Fire Regimes of the Pacific Northwest

I	<35 years non-lethal, low severity (mostly forested areas)
II	<35 years stand replacing (grasslands and shrub lands)
III	35-100+ years mixed severity
IIIa	< 50 years, mixed severity (lower severity fire predominates)
IIIb	50-100 years, mixed severity
IIIc	100-200 years, mixed severity (higher severity fire predominates)
IV	35-100+ years, stand replacing
IVa	35-100+ years, stand replacing, juxtaposed
IVb	100+ years, stand replacing, patchy arrangement

Table 11c. Fire Regimes of the Pacific Northwest	
IVc	100-200 years, stand replacing
V	200+ years, stand replacement
Va	200-400 years, stand replacing; somewhat fire-adapted
Vb	400+ years, stand replacing; weakly or not fire-adapted
Vc	No fire; no evidence of fire for 500 or more years
Vd	Non-forest; small, low-growing species; barren ground is common

Condition class descriptions: Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities. Condition classes range from 1 (least altered) to 3 (most altered) (Table 11d).

Table 11d. Condition Class Descriptions

Condition Class	Attributes	Example Management Options
Condition Class 1	▪ Fire regimes are within or near an historical range. ▪ The risk of losing key ecosystem components is low. ▪ Fire frequencies have departed from historical frequencies (either increased or decreased) by no more than one return interval. ▪ Vegetation attributes (species composition and structure) are intact and functioning within an historical range.	Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.
Condition Class 2	▪ Fire regimes have been moderately altered from their historical range. ▪ The risk of losing key ecosystem components has increased to moderate. ▪ Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This change results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. ▪ Vegetation attributes have been moderately altered from their historic ranges.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.
Condition Class 3	• Fire regimes have been significantly altered from their historical range. • The risk of losing key ecosystem components is high. • Fire frequencies have departed (either increased or decreased) by multiple return intervals. This change results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. • Vegetation attributes have been significantly altered from their historic ranges.	Where appropriate, these areas need high levels of restoration treatments, such as hand or mechanical treatments. These treatments may be necessary before fire is used to restore the historical fire regime.

Condition Class 1 = Fire frequencies are within or near the historical range and have departed from historical frequencies by no more than one return interval; vegetation attributes are intact and functioning within the historic range. The risk of losing key ecosystem components is low.

Condition Class 2 = Fire frequencies and vegetation attributes have been moderately altered from the historical range, and fire frequencies have departed from historical frequencies by more than one return interval. The risk of losing key ecosystem components is moderate.

Condition Class 3 = Fire frequencies and vegetation attributes have been significantly altered from the historical range, and fire frequencies have departed from historical frequencies by multiple return intervals. The risk of losing key ecosystem components is high.

Post-Fire Condition – Fuels and Vegetation

Within the Biscuit Fire, approximately 253,000 acres burned through vegetation classified as Fire Regime I, which has an historical fire return interval less than 35 years with low severity, non-lethal fires. These areas primarily supported the Douglas-fir, ponderosa pine, Jeffery pine, and dry white fir plant associations with median fire return intervals of 15, 7, 25 and 25 years, respectively. The Fire Regime information used in this section is based on plant series data from the Siskiyou National Forest (Atzet 2000, personal communication).

Also, approximately 206,000 acres that burned were classified as historical Fire Regime III, which has a fire return interval of 35-100+ years with mixed-severity fires. These areas would have burned in a mosaic pattern of high, medium and low intensity fires with aspect, elevation, vegetation, weather conditions, and slope steepness primarily determining fire intensity. These areas supported the tanoak, moist white fir, and dry western hemlock plant associations with median fire return intervals of 50-60, 49, and 91 years, respectively. The dry tanoak plant association is placed in historical Fire Regime IIIA, which had a fire return interval of less than 50 years, with low intensity fires predominating. Approximately 54,000 acres of this fire regime burned in the Biscuit Fire.

A little over 8,000 acres of the Port-Orford-cedar, Shasta red fir, and coastal western hemlock plant associations also burned. These areas are classified as Fire Regimes IV or V, where the historical fire return interval is 35 to more than 200 years with stand-replacing fires predominating. These plant associations are mainly found on moist sites and in riparian areas.

Reports on the 1987 fires on the Siskiyou National Forest indicate that between 12 and 27 percent of the area within the fire perimeters burned at stand replacement intensity. Records from the 1937 Cedar Camp Fire indicate similar proportions of high intensity fire (12%) (Gripp, internal Forest Service Report). For the Biscuit Fire, in 2002, a significantly higher proportion of the area burned with high intensity fire (approximately 44% with greater than 75% canopy mortality) (Vegetation Change satellite imagery).

The Biscuit Fire also burned through the brush and snags created by the 96,240 acre Silver Fire in 1987. In some places, high intensity fire behavior occurred because snags, downed logs, and brush from the Silver Fire contributed to the intensity of the Biscuit Fire. Experience from past fires indicates that stands with high mortality from a previous fire generate high intensity fire behavior and control difficulties in subsequent fires.

For instance, approximately 11,000 acres within the 1987 Silver Fire Area had burned in the Cedar Camp Fire of 1938. The lightning-caused Cedar Camp Fire burned a total of 34,627 acres on the Chetco Ranger District from July 14th through August 8th. In January 1988, an analysis and comparison of the Cedar Camp and Silver Fires was completed for the Kalmiopsis Wilderness Fire Management Action Plan (internal Forest Service document, Siskiyou National Forest, 1988) using aerial photographs. The following is a summary of the fire intensities for the entire fire area of each fire from that analysis:

Cedar Camp Fire Intensities		Silver Fire Intensities	
Low	64%	Low	54%
Moderate	21%	Moderate	33%
High	15%	High	12%

The analysis then compared only the 10,942 acres that had burned in both the Cedar Camp and Silver Fires. Those results are shown below:

Cedar Camp Fire Intensities		Silver Fire Intensities	
Low	66%	Low	59%
Moderate	19%	Moderate	28%
High	15%	High	13%

The above comparison shows very similar intensities, though not an exact match. Many of the areas that burned with high intensity in 1938, burned with high intensity in 1987. Similar correlations can be seen with the low and moderate intensities.

As stated earlier, approximately 44% of the Biscuit Fire within the Siskiyou National Forest (roughly 204,000 acres) contains stands with high fire mortality (greater than 75 percent). Conversely, many of the forested areas that survived within the Biscuit Fire had burned with low intensity fire in the earlier Silver Fire or in other recent wildland or prescribed fire areas. This is because stands that burn with low intensity "under burns" tend to burn with low intensity in subsequent fires. Low intensity surface fires allow the larger, more fire resistant trees to survive, while removing surface fuels and ladder fuels (or understory vegetation that can move a surface fire into the crowns of overstory trees).

In the areas of high and moderate intensity the remaining primary dead fuel loading is in the larger size classes such as the 1,000 hour (3-6 inch diameter) and 10,000 hour plus (6-9 inch diameter plus) size classes. There are varying opinions on the exact role these large fuels play in future fire behavior and intensity. These fuels will likely not be a major contributor to future fire spread rates. They do affect fire line production rates and the ease of access to or egress from future wildland fires. And, under high to extreme burning conditions, their contribution will be to increase future fire intensity and severity. These large fuels contribute by providing large sustained pulses of heat into the soil, which can impact long-term site productivity and water permeability.

Under normal summer conditions these heavy fuels also contribute to spotting potential by producing firebrands, which are lofted into the air and carried by the wind or the smoke plume until they are deposited onto receptive fuel beds out in front of the main fire. The snags that remain standing are both a receptor for and a producer of firebrands. Spotting is a primary method of fire propagation across a landscape.

As the remaining snags begin to fall to the ground they will begin adding to the surface fuel loading. At the same time, regrowth of sprouting hardwood and brush species, and conifer seedlings, will rapidly reoccupy all but the least productive sites within the Biscuit Fire area. This combination of dense new vegetation and dead down logs and standing snags will create a significant impediment to controlling future wildland fires. This condition is known as resistance to control or: the relative difficulty of constructing and holding a fire control line as affected by resistance to line construction and fire behavior. Resistance to line construction is the relative difficulty of constructing control lines as determined by the fuel, topography, and soil (National Wildfire Coordinating Group, page G-16; 1998). The U.S. Forest Service described resistance to control as early as 1968. The principal items to be considered (USDA FS 1968) in estimating resistance to control are:

- Ground cover conditions – low brush, weeds, vines, etc. that will slow up the rate of line construction.
- Number and size of snags to cut.
- Number and size of windfalls (logs) that must be cut.
- Amount of rotten wood and depth of duff and litter to mineral soil.
- Brush, poles, and reproduction to be cut.
- Soil conditions, rocks, and roots as they affect line digging.
- Slope of the terrain as it affects production.

The first five items on the above list deal with vegetation and fuels

The areas of the Biscuit Fire that burned at low to very low intensity will have a short-term alteration of fuels and vegetation, expected to last 3-5 years as vegetation recovers to pre-fire conditions. In these areas an initial increased loading in the 1 and 10-hour dead fuels (0" –¼" and ¼" - 1" diameter) will occur as

needles and small branches drop for the first year or two. The duff layer had little modification by the fire in these areas. Duff will still add to smoldering and potentially high soil temperatures. Resprouting brush will serve as a heat sink initially, which provides a moderating effect on fire behavior. Some ladder fuels may remain from green understory vegetation. Scorched vegetation may contribute to ladder fuels for up to two years until scorched needles and leaves fall.

As the Silver Fire area burned again within 15 years, the potential for large wildland fires within the Biscuit Fire area will increase over time, especially in the more remote and inaccessible areas. These future fires will have the potential of expanding beyond the current perimeter of the Biscuit Fire due to the vegetative condition of many of the stands adjacent to this perimeter.

An example of wildland fire behavior within the Silver Fire area can be seen in the following photos of the Craggie Fire (Tin Cup Creek drainage) in September 2001. Where this fire burned through the brush and downed logs from the trees killed in a high intensity burn area of the Silver Fire, flame lengths easily exceeded 50 feet. Where the Silver Fire burned as a low intensity underburn the Craggie Fire also burned with low intensity and underburned through portions of the same stand (west flank of the Craggie Fire).

Post Fire Fuel Models. Table 11e shows the changes in fuel models from pre to post fire, within the first 1-5 years. In the post fire row the bolded fuel models show a reduction in future fire intensity's.

Table 11e. Post-Fire Fuel Models

Pre-fire Fuel model	FM 1	FM 2	FM 4	FM 5	FM 6	FM 8	FM 9	FM 10	FM 11	FM 12
Post-fire Fuel model	FM 1	FM 2	FM 5	FM 5	FM 5	FM 8	FM 5	FM 8	FM 8	FM 8

Understanding the effects of the various burn severity levels is important in understanding both proposed actions and natural responses. Burn severity and intensity is partially a function of vegetation. The fire modified existing fuel models. The fire areas that burned at high and moderate severity were reset to an early seral condition. These areas will return to the associated fuel models that were initially identified prior to the Biscuit Fire and will follow progression through time for vegetation recovery.

Fire Severity (Intensity) and Frequency: Fire severity is the degree to which vegetation and a site have been altered or disrupted by a fire. At present, there is no well described meaning of the term. In general, it is a combination of the degree of crown scorch and consumption, bark char, mortality of the plants, organic matter consumption, and the degree of exposure, discoloration and changes in soils.

The federal lands in the assessment area have a low amount of fires, but a high percentage of large fires (1929, Elk River; 1938, Cedar Camp; 1970, Quail Creek; 1987, Silver, Longwood, and Galice; 1990, Chrome; 1994, Mendenhall). Damage, as measured by percent of crown consumed, has been less severe than anticipated (approximately 15% high intensity on the 100,000+ acre Silver Fire). Many fires exhibit extreme fire behavior on only the SE, S, and SW aspects, with a backing fire occurring on the other aspects. East wind conditions, which occur primarily October through December, contribute to these large fires. Managed stands can also exhibit extreme fire behavior.

Results: In the Klamath Province, fire is the most important agent of disturbance (Table 12). Ninety-eight percent of the older forest stands sampled for the ecology plot database (Siskiyou National Forest) had some evidence of disturbance. In most cases, several agents were responsible, but the effects of fire were most prevalent in 63%. The average age of the older stands was 237 years. The oldest was 800 years. The mean return interval was 42 years and the longest interval between disturbances was 150 years. Human activities, such as logging, are increasing, but were dominant in only 23% of the stands sampled. Harvested stands, however, were avoided in the sample. Disease, insects, ice, and landslides are common disturbance agents, but their effects usually are subtler than fire.

Map 8: Southwest Oregon Port Orford Cedar Status

Map 9: Southwest Oregon - Risk of Decline in Tree Health in LSRs

Table 12. Fire Regimes And Average Disturbance Characteristics For The Siskiyou National Forest (this information will be updated based on draft plant associations).

Series	Average Stand Age (years)	Average Interval (years) 2/	Estimated Interval Range 2/	Fire Regime Group 3/	Siskiyou NF Acres	Fire Sub Regime 3/, 4/
ABCO (white fir)	213	25	10 - 60	I & III	83,727	I Dry Sites Below 4700' Elevation; III-C: Over 4700' Elevation; III-B:All Other ABCO
PSME (Douglas-fir)	230	15	1 - 20	I	231,673	I
ABMAS (Shasta red fir)	214	40	25 - 110	IV	5,199	IV-A
CHLA (Port-Orford-cedar)	419	50	40 - 130	IV	15,564	IV-A
PIJE (Jeffrey pine)	282	69	10 - 80	III	83,532	I
TSHE (Western hemlock)	281	91	30 - 70	III & V	163,591	III-B Cascades & Inland Siskiyou Mtns, below 4000' Elevation; V-A: Coastal Siskiyou Mtns and Above 4000' Elev.
LIDE (tanoak)	243	12	5 - 150	III	577,746	III-A: Dry Sites III-B: Wet Sites
TSME (mountain hemlock)	313	23	10 - 300	V	0	V-A

1/ Source - Paradox database for ecology plots
2/ Updated with information from personal communications with Tom Atzet on 3/15/99 & 11/20/2000
3/ Determined by Tom Atzet on 10/30/2000
4/ As described at the Region 6 Fire Regime Workshop held 10/10/2000. Refer to "Field Guide to the Forested Plant Associations of Southwest Oregon," September, 1996.

For the fire regimes in the different plant series, several trends are noted. As the interval between fires increase, the severity of the fires increases. Conversely, as the number of fires goes up, the fire intensity tends to be lower.

Tables 12a to 12d display *Affect of Fire Behavior Fuel Model (FBFM) Change on Predicted Flame Length, Crown Fire Potential, Spotting Distance, and Probability of Mortality* based on four different vegetative types.

Table 12a. Brush Stands & Sprouting Hardwoods (manzanita, snow brush, poison oak, golden chinquapin, madrone and tanoak).

Fire Behavior Indicator (90^{th} Percentile Weather)	Current Condition (Fuel Model 0)	Predicted 2008 (Fuel Model 5)	Predicted 2013 (Fuel Model 6)	Predicted 2018 (Fuel Model 4)
Flame Length (ft)	N/A	4.6	4.3	14.3
Crown Fire Potential*	Low	Low	Low	High
Spotting Distance (miles)	N/A	.2	.2	.3
Probability of Mortality**	N/A	N/A	N/A	N/A

Table 12b. Mixed Conifer Stands (Douglas-fir, white fir, western hemlock, Port-Orford cedar).

Fire Behavior Indicator (90^{th} Percentile Weather)	Current Condition (Fuel Model 0)	Predicted 2008 (Fuel Model 8)	Predicted 2013 (Fuel Model 10)	Predicted 2018 (Fuel Model 10)
Flame Length (ft)	N/A	.8	3.9	5.1
Crown Fire Potential*	N/A	Low	Moderate	High
Spotting Distance (miles)	N/A	.3	.3	.3
Probability of Mortality (%) **	N/A	DF = 6% PP = 8% SP = 30%	DF = 6% PP = 8% SP = 30%	DF = 6% PP = 8% SP = 30%

Table 12c. Hardwood (tanoak, madrone, golden chinquapin, etc).				
Fire Behavior Indicator (90^{th} Percentile Weather)	Current Condition (Fuel Model 0)	Predicted 2008 (Fuel Model 5)	Predicted 2013 (Fuel Model 6)	Predicted 2018 (Fuel Model 9)
Flame Length (ft)	N/A	4.6	4.3	2
Crown Fire Potential*	N/A	Low	Low	High
Spotting Distance (miles)	N/A	.2	.2	.1
Probability of Mortality**	N/A	N/A	N/A	N/A

Table 12d. Mixed Conifer, Predominantly Open Pine Stands (ponderosa pine, Jeffrey pine, sugar pine & Douglas-fir) with <40% Canopy Closure.				
Fire Behavior Indicator (90^{th} Percentile Weather)	Current Condition (Fuel Model 0)	Predicted 2008 (Fuel Model 2)	Predicted 2013 (Fuel Model 6)	Predicted 2018 (Fuel Model 4)
Flame Length (ft)	N/A	4.2	4.6	14.3
Crown Fire Potential*	N/A	Low	Low	Moderate
Spotting Distance (miles)	N/A	.3	.2	.3
Probability of Mortality (%) **	N/A	PP = 8% JP = 8% SP = 30%	PP = 8% JP = 8% SP = 30%	PP = 95% JP = 95% SP = 99%

* Low = Surface Fire; Moderate = Passive Crown Fire; High = Active Crown Fire
** 21" DBH (to model remaining late successional habitat)

Table12e describes historical fire regimes and reference fuel models, within the Biscuit Fire area, relating to Plant Association Groups. Fire regime acres by LSR, within the Biscuit Fire, are described in Table 12f.

Table 12e. Plant Association Groups, Historical Fire Regimes & Reference Fuel Models, Within the Biscuit Fire Area.			
PAG	% Of Acres	Historical Fire Regime[1]	Reference Fuel Model(s)[2]
Oregon white oak – SW Oregon	0	I	1, 2
Port-Orford-cedar	1.2	IVA	8, 10
Douglas-fir – Dry	26.1	I	2, 8, 9
Douglas-fir – Moist	2.6	I	8, 9, 10
Serpentine- SW Oregon	15.2	I	2, 9
Tanoak- Dry	11.6	IIIA	8, 9
Tanoak-Moist	32.1	IIIB	8, 9, 10
Western hemlock – Dry	0.1	IIIB	8
Western hemlock – Coastal	0.1	VA	8, 10, 11
White fir– Dry	10.4	I	8
White Fir – Moist	0.2	IIIB	8, 10, 11
Shasta red fir-white fir	0.4	IVA	8, 10, 11

Table 12f. Fire Regime Acres by LSR.					
OWNERSHIP	FIRE NAME	LSR NAME	FIRE REGIME	Acres	Totals
BLM	BISCUIT	FISH HOOK		25.87645	
BLM	BISCUIT	FISH HOOK	I	2769.39845	
BLM	BISCUIT	FISH HOOK	IIIA	2750.68267	
BLM	BISCUIT	FISH HOOK	IIIB	242.5564	
BLM	BISCUIT	FISH HOOK	IVA	1313.5296	7,102
FS	BISCUIT	BRIGGS		184.84305	
FS	BISCUIT	BRIGGS	I	26083.27186	
FS	BISCUIT	BRIGGS	IIIA	9323.28204	
FS	BISCUIT	BRIGGS	IIIB	1065.3481	
FS	BISCUIT	BRIGGS	IIIC	58.44523	
FS	BISCUIT	BRIGGS	IVA	537.02484	37,252
FS	BISCUIT	FISH HOOK		187.19451	
FS	BISCUIT	FISH HOOK	I	31679.39296	
FS	BISCUIT	FISH HOOK	IIIA	27055.43255	
FS	BISCUIT	FISH HOOK	IIIB	33652.60113	
FS	BISCUIT	FISH HOOK	IVA	2083.27721	
FS	BISCUIT	FISH HOOK	VA	474.6519	95,133
FS	BISCUIT	NORTH CHETCO		60.68058	
FS	BISCUIT	NORTH CHETCO	I	4593.77035	
FS	BISCUIT	NORTH CHETCO	IIIA	35.51929	
FS	BISCUIT	NORTH CHETCO	IIIB	14070.04261	
FS	BISCUIT	NORTH CHETCO	IVA	232.34287	
FS	BISCUIT	NORTH CHETCO	VA	64.02718	19,056
FS	BISCUIT	NORTHWEST COAST		1.32498	
FS	BISCUIT	NORTHWEST COAST	I	0.27141	
FS	BISCUIT	NORTHWEST COAST	IIIA	0.69049	
FS	BISCUIT	NORTHWEST COAST	IIIB	20.41138	
FS	BISCUIT	NORTHWEST COAST	VA	1.00361	24
FS	BISCUIT	SOUTH CHETCO		33.89822	
FS	BISCUIT	SOUTH CHETCO	I	1375.88882	
FS	BISCUIT	SOUTH CHETCO	IIIA	31.26323	
FS	BISCUIT	SOUTH CHETCO	IIIB	6365.26095	7,806
FS	BISCUIT	WEST IV		505.18883	
FS	BISCUIT	WEST IV	I	37073.04771	
FS	BISCUIT	WEST IV	IIIA	548.20533	
FS	BISCUIT	WEST IV	IIIB	4637.40613	
FS	BISCUIT	WEST IV	IIIC	34.02957	
FS	BISCUIT	WEST IV	IVA	78.36206	42,876

Table 12f. Fire Regime Acres by LSR.					
OWNERSHIP	FIRE NAME	LSR NAME	FIRE REGIME	Acres	Totals
PV	BISCUIT	BRIGGS	I	1.07854	1
PV	BISCUIT	FISH HOOK	IIIB	1.81611	2
					209,252

Growth and Health Processes: Existing characteristics of the older forests in each major plant series are important references for both monitoring and future conditions (Table 13)

Table 13: Existing Processes for Older Forest Stands	
Plant Series	**AVERAGES of Overstory Tree and Stand Characteristics**
ABCO	Fire Regime Group I & III; Subgroup = I: Dry Sites Below 4700' Elevation; III-C Over 4700' Elevation; III-B All Other ABCO Growth rate good at 15/20ths Average stand age Doug-fir 185 yr; white fir 135 yr Live crown ratio 50% Down wood very high Snags about 5/ac >20 in dbh Wildland fire risk low
ABMAS	Fire Regime Group IV; Subgroup = IV-A Growth rate high at 17/20ths Average stand age 130 to 140 yr Live crown ratio 50% Down wood high, high in fines, low in coarse Snags about 5/ac >20 in dbh Wildland fire risk low "Better shape" than ABCO regards fire risk
CHLA	Fire Regime Group IV; Subgroup = IV-A Average stands tend to be older (250 to 300 yr.) Growth rate low at 10/20ths Live crown ratio 45% Down wood to be computed Per acre #s of trees, snags and down wood to be computed Wildland fire risk is low.
LIDE3	Fire Regime Group III; Subgroup = III-A dry sites; III-B wet sites Doug-fir component of stands tend to be younger at <200 yr Growth rate low at 11/20ths Per acre #s of trees snags and down wood to be computed Wildland fire risk is moderate to high
PIJE	Fire Regime Group I; Subgroup = I Average stand age 190 yr tending toward climax Growth rate low at 5/20ths Live Crown ratio 50% Down wood low at 9/ac > 20in dia Wildland fire risk is low.
PSME	Fire Regime Group I; Subgroup = I Average stand age 170 yr Growth rate low at 12/20ths. Live crown ratio 45% Down wood 25/ac high but tends toward small pieces Wildland fire risk is high.
TSHE	Fire Regime Groups III & V; Subgroup = III-B Inland Siskiyou Mtns. below 4000'

Table 13: Existing Processes for Older Forest Stands	
Plant Series	**AVERAGES of Overstory Tree and Stand Characteristics**
	elevation; V-A Coastal Siskiyou Mtns. and above 4000' Average stand age Doug-fir 225 yr and w hemlock 120 yr Growth rate Doug-fir 13/20ths and western hemlock 21/20ths Snags and down wood to be computed Wildland fire risk is low.
Fire Regime Condition Class Descriptions	I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced); II – 0-35 year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced); III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced); IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced); V – 200+ year frequency and high (stand replacement) severity.

VI. TRENDS FOR ELEMENTS AND PROCESSES

UPDATE NOTE: This section has not been reviewed by a Forest Ecologist.

Though describing our future is the most important part of the assessment, we also need to assess trends to indicate risks associated with maintenance of older forests. If the risk is not high, there may be no reason to act. However, we need to assess any threats to the desired range of conditions. The trends and existing conditions then help us understand the condition of the LSRs and future possible actions.

The trends for forest elements such as large trees, snags, large woody material (on soil and in streams), multiple canopy layers, understory trees, and associated canopy gaps with a patchy understory provide understanding for maintaining future older forests. This chapter addresses elements such as the interior older forest habitat patches and unique habitats such as meadows and elk requirements. The general trends of growth rates, crown ratios, ages, wildland fire, fuels, snags, down wood, insects, and disease conditions for the plant series are listed below.

A. Trends by Plant Series

Table 14 presents different forest processes that can be addressed by plant series. Growth, mortality, risks of wildland fire, and susceptibility to insects/diseases are discussed.

Table 14: Trends for Forest Processes and Elements	
Plant Series	Trends for Older Forest Stands and Average Stand Conditions
All Plant Series	Insects and disease will continue to play an important role in providing disturbance. Without wildland fire, prescribed fire, or thinning, forests within these plant series will be increasingly vulnerable on a large scale to insects and diseases. Potential for more severe wildland fire will increase in all plant series as fine and coarse fuels increase and other disturbance events such as fire or thinning are absent from the landscape. This trend will manifest first in the ponderosa pine, Douglas-fir, and tanoak plant series, given other factors of tree density, aspect, soil moisture, etc. equal consideration
ABCO	Growth rate will slow as stands age. Down wood and ladder fuels will increase without wildland fire. Snags will increase without wildland fire. Stand replacement wildland fire potential increases as fuels increase.
ABMAS	Growth rate will slow as stands age. Down wood and fine fuels will increase without the presence of fire. The size and numbers of future snags will increase without the presence of fire. Stand replacement wildland fire potential increases as fuels increase.
CHLA	Average stand age will remain older at 250 to 300 yr. Growth rates will continue to increase as

Table 14: Trends for Forest Processes and Elements	
Plant Series	Trends for Older Forest Stands and Average Stand Conditions
	stands age. Wildfires will tend to be low and moderate intensity. Resistance to insects and diseases will decrease. Older and larger Port-Orford cedar and Doug-fir will survive fire. [We are currently initiating a study to examine the effects of fire intensity in different plant series with POC and *P. lateralis* on survival of both resistant and non-resistant POC. Planting will occur in spring of 2004 and be monitored for 5 years.]
LIDE3	Low growth rate of Doug-fir component will continue. Tanoak component will increase in # and dbh without wildfire. Wildland fire potential, especially stand replacement fire, will increase with age and small fuel buildup. As fires occur, tanoak will be set back and Doug-fir will be enhanced.
PIJE	Average stand age will increase w/o wildfire; will remain constant with frequent, low intensity fire. Growth rate will remain low w/o fire; growth will increase w/fire. Down wood and snags have no change or slight increases with or without fire. Wildland fire will tend to be low and moderate intensity.
PIPO	Stand age will increase without disturbance events. Growth rate will remain low as stands age without disturbance. Crown ratio will stay constant or decrease slightly as trees age. The number of snags (average of 2.4/acre) will increase with and without fire. Down wood will increase without fire; decrease with fire. Insects and disease would increase without fire, decrease with fire.
PSME	Stand age of large trees (average of 170 yr) will increase. Growth rate 12/20ths will stay low without fire; increase with fire. Down wood will increase without fire; high fines will decrease with fire. Wildland fire potential, especially high intensity fire, will increase.
TSHE	Average age of western hemlock component of stand will increase. Growth rate of Doug-fir will remain low; hemlock's growth rate will slow gradually. Doug-fir snags and down wood will increase; western hemlock snags and down wood will remain low until trees mature. Wildland fire potential will remain relatively low without fire with increasing % of western hemlock; with fire, more Doug-fir and less hemlock will be present. The forest processes and forest elements important for older forests have several trends that are or are not desirable for maintaining the viability of species associated with late-successional habitat. Most of these unhealthy trends are influenced by two major disturbance patterns: timber harvest and fire.

B. Older Forest Trends Based on Past Timber Harvest

Large Trees: The trends in the amount and distribution of large trees have been greatly influenced by harvest activities. It can be assumed that harvest in the PIPO, ABCO, PSME, TSHE, and LIDE plant series combinations have reduced the number and acres of big trees and have fragmented the landscape with clearcuts. Not much commercial activity has occurred on the PIJE series and ABMAS series. The CHLA plant series mainly occurs in the riparian areas where previous management did not clearcut as much. This harvest effect is probably most noticed in the TSHE plant series.

Canopy and Understory Characteristics: On all plant series, the stand density of the resulting managed stands in many areas is too high, limiting the growth of trees. Up to 1,000 trees per acre are growing (Managed Stand Database, Siskiyou National Forest). These stand densities limit the development of big trees, has limited canopy gaps, and limit understory development. In addition, these stand densities are slow to develop multistoried canopies and patchy understories characteristic of late-successional forests. On some stands, particularly in the tanoak plant series, plant competition limits tree establishment and growth. This trend can slow the development of late-successional characteristics.

Snags, Large Woody Material, and Fire: On all plant series, managed stands, especially the older harvest units, are lacking in the snag and large woody material components. Despite this lack of dead wood, these stands tend to have a potentially high rate of spread and a high intensity level of fire due to the closed canopies and single-storied stands.

Patch Size: The patch sizes in LSRs have been fragmented by harvest units, though the fragmentation is not statistically different from the Silver fire. However, in the LIDE3 plant series, the Williams, West IV, Galice, South Chetco, and Northwest Coast LSRs are lacking the larger patch sizes found in the base line conditions represented by the Silver Fire area and respective plant series. Existing interior patches in each LSR are small in number and important for interior older forest habitat. In addition, several LSRs have a smaller average patch size than Silver, also indicating a need to grow larger patches of older forest. In particular, these LSRs are: the North Chetco, South Chetco, and West IV for the PSME plant series; West IV for the ABCO plant series; Northwest Coast, and Galice LSR for the LIDE3 plant series; and the Northwest Coast and Galice LSRs for the TSHE plant series.

C. Forest Trends and Fire

The suppression of fires since the 1930's has added to the trend of high rate of spread of fire and increased intensity of fire characteristic of managed stands and the forest in general (Maps 10 and 11). This effect is particularly found in the eastside LSRs (Williams, East IV, West IV, Briggs, Taylor, Galice, and Fish Hook). Fire exclusion, especially in the lower elevations, has left overstocked stands, especially trees in the 0-60 age class.

On many sites, this increased stocking level and drought conditions have increased the water stress on the older overstory trees. In high risk areas where ponderosa pine and sugar pine comprise the overstory, these large trees are dying at an increased rate due to bark beetles. Douglas-fir has also been affected. These high risk areas are mapped in Map 9. The LSRs that have a coastal climatic influence (South Chetco, North Chetco, and Northwest Coast) have a lower risk than mapped in this figure.

These stocking levels have also increased fuels loading, especially in the plant series which, before fire suppression, had frequent low and moderate intensity fires. With the suppression of these fires, the fuel loading will now support large, intense fires rather than low intensity fires. This is especially evident in the Douglas-fir and Ponderosa Pine plant series. These higher levels of fuel loads put existing older forest habitat at a higher risk of stand replacement fire.

The Jeffrey pine plant series supports many sensitive and unusual plant species, some of which are adapted to fire. Little management and fire suppression have limited the disturbance on these areas. Consequently, the processes of nutrient cycling and implications for regeneration of some plant species are evident, where fire has not occurred.

In the LSRs, fire maintained the meadows and oak/pine savannas by killing invading trees. With the exclusion of fire, these unique wildlife habitat sites are becoming smaller by up to 50% (figure 8). Other sensitive species, such as *Frasera umpquensis*, *Pedicularis howellii*, and *Bensoniella oregana* are found within meadows, edge habitat, or small openings within a late successional stand. Maintaining this habitat will be important to maintaining these species.

Another species of concern is *Sophora leachiana*. Its entire range is between the Rogue River and the Illinois River growing in disturbed areas. It is dependent on fire disturbances to create the open sites and possible seed scarification it prefers. The lack of fire will decrease its population levels.

Percent of managed stands range from a low of 1% in West IV to a high of 35 % in East IV LSR. Due to past management practices of increasing fuels by manual release and pre-commercial thinning, many stands now exhibit high rates of fire spread and intensity, which may result in total loss of stand.

Maps 10 and 10a and 11 and 11a depict average (50th Percentile) and average worst (90th Percentile) Wildfire Rates of Spread and Flame Length based on historical weather conditions from a representative weather station (Quail Prairie) and National Fire Danger Rating Fuel Model G.

Map 10: Southwest Oregon 50th Percentile Flame Lengths (Feet)

Map 10a: Southwest Oregon 90th Percentile Flame Lengths (Feet)

Map 11: Southwest Oregon 50th Percentile Rate of Spread (Feet/Hour)

Map 11a: Southwest Oregon 90th Percentile Rate of Spread (Feet/Hour)

Map 11b: Fire Regimes Based on Plant Series, for the ROR-SIS NF

Map 11c: Fire Regimes Based on Draft Plant Association Groups, in the Biscuit Fire area

VII. Management Implications - What and Where

UPDATE NOTE: This section has not been reviewed by a Forest Ecologist.

The desired conditions of the older forests, their priorities for treatment or no treatment, and project implications flow from the historical and existing conditions, and trends. This chapter presents the desired conditions (the most important part of the assessment) for the late-successional reserves. Then, we measure our progress to achieve these conditions with specific reference to recent conditions. Consequently, the desired conditions set the course for targeting future management activity. If existing conditions are the same as our desired future, there is no reason to act. However, trends may indicate a risk associated with maintenance. If the risk is not high, again, there may be no reason to act. However, we need to assess any threats to the desired range of conditions.

A. Desired Conditions

General Elements. It is important to know what the desired elements can be for conditions in older forests. Table 15 "Desired Ranges" provides an initial estimate of desired ranges by plant series, based upon current data, a "Supplement to Standards and Guidelines" 4-13a, 4-13b, 7-8 and 7-10: "Large woody material and wildlife reserve trees" (developed by Ed Gross, Linda Mullens, and Lee Webb of the Siskiyou National Forest as supplemental direction for the Forest Plan), and integration of information by the LSR assessment team.

Sub items of major tree species are listed so as more information is known, it can be added. All desired conditions are the best judgment of the LSR assessment team, based upon the relative productivity of each plant series, existing natural conditions in each plant series (ecology plot data), and observed growth rates and crown ratios of trees that survive.

Table 16 shows large woody material amounts pieces to cubic feet to tons.

Table 15. Desired Conditions of Forest Elements																
PLANT SERIES	**ABCO**		**ABMAS**		**CHLA 3/**		**LIDE3**		**PIJE**		**PIPO**		**PSME**		**TSHE**	
Two Major Tree Species1/	PSME	ABCO	ABMAS	ABCO	PSME	CHLA	PSME	LIDE3	ABMAS	PSME	PSME	PIPO	PSME	PILA	PSME	TSHE
BIG TREES																
	#/Acre															
Diameter Average (inches DBH)																
Growth Rate Last 10 years (20ths of an Inch)	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15	>15
Average Age (Years)	>200	>200	>150	>150	>250	>250	>200	>200	>200	>200	>200	>200	>200	>200	>200	>200
Crown Ratio (%)	>45	>45	>45	>45	>45	>45	>45	>45	>45	>45	>45	>45	>45	>45	>45	>45
SNAGS																
Average Diameter (inches)	>30”	>30”	>24”	>24”	>30””	>30”	>24”	>24”	>12”	>12”	>24”	>24”	>24”	>24”	>30”	>30”
Height (ft)	>45’	>>45’	>45’	>45’	>45’	>45’	>45’	>45’	>45’	>45’	>45’	>45’	>45’	>45’	>45’	>45’
Decay Class2/	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
#/Acre	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5
DOWN WOOD																
Decay Class2/	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4
Minimum Avg Diameter = 20 in																
#/Acre	12	12	12	12	12	12	15	15	10	10	10	10	15	15	12	12
Minimum Avg Length per piece = 20 ft. (ft)																

1/ Regeneration tree species are listed in the Siskiyou LSR Ecoplot Analysis planning records. Various plant series have over 20 different species that regenerate successfully on any given site.

2/ Decay classes as defined by ecosystem inventory Siskiyou National Forest.

3/ As a result of fire exclusion, recruitment of fresh down logs may have diminished. Logs that would have burned up in the past now remain and achieve higher decay classes. Tom Jimerson (Zone Ecologist for northwest California, FS) believes that POC logs seldom achieved a decay class greater than 3 before they were consumed by fire. Current conditions for all species of down logs are that there are a greater number of down logs than that seen historically and they reach a higher decay class. Diane White’s analysis of plot data from the Roseburg BLM showed a statistically significant change in decay class between plots that had a fire and those that didn’t.

Table 16. Large Woody Material Amounts (Pieces to Cubic Feet to Tons)		
Pieces	Cu.Ft./Acre	Tons/Acre
10	430	9
12	516	11
15	645	14

Minimum Average Piece = 20 Inches (diameter) x 20 Feet (length)
Average Wood Density = 42 lbs/Cu.Ft.

Older Forest Patches. Development of large well connected patches of interior older forest habitat should be concentrated where stand replacement fires are less frequent, such as on north aspects and in plant series heavily influenced by moisture. Maps of the Silver Fire and historic Grayback/Sucker Creek areas support this expectation. Priority for developing large connected patches should be on north aspects and/or within plant series less prone to large stand replacement events. Existing patches should be protected wherever they exist, but especially where risk of stand replacement is high. See map 3 for location of existing patches; maps 10a and 11a displays those sites where stand replacement fires are most likely. In addition, some site-specific fire modeling will help predict those patches susceptible to intense fire. The forest is in the process of updating our Fire Management Plan. At that time the fuel models will be updated.

Adopting strategies to develop and protect connections and large patches also meets the expectations of USDI Fish and Wildlife Service, as stated in the Northwest Forest Plan, Appendix G, page 19: "The Service believes dispersal questions as well as the short term lack of habitat structure and other biological considerations, are built into the watershed analysis process and will be included in plans developed by local teams..." All land allocations within federal lands in the assessment area provide habitat connections that allow dispersal of wildlife and plant species across the landscape.

For various reasons, the function of late-successional habitat in Matrix is related to late-successional habitat in LSRs. Matrix lands are the areas where most timber harvest and other silvicultural activities are conducted. On the Siskiyou National Forest, 7% of the lands support the programmed timber harvest. Programmed harvest in Matrix can help support the LSR strategy in several ways and not reduce the amount of planned timber harvest. Older forests in matrix function as some connections between the various Late-Successional Reserves and currently provide a small percentage of large patches of interior older forest habitat.

Riparian Reserves are expected to be the primary connections between patches of older forest in Matrix. However, some areas within these Riparian Reserves currently do not harbor older forest habitat, and do not serve as adequate connections. Furthermore, a connection needs to be at least 1,000 feet wide to function as interior late-successional habitat.

Development and maintenance of large connected patches of interior habitat in Matrix and Riparian Reserves can help sustain the function of late-successional habitat in LSRs; this is especially important in the next several decades, as more of the land in LSRs begins to reach mid or later age. The following suggestions are offered:

Matrix as Connections*:* Possibly consider future connections at least 1000 feet wide through the Matrix land allocation by scheduling timber harvest so that connections of similar aged habitat will someday be continuous connections of suitable habitat for late-successional species. Riparian Reserves should make up most of the area in connections. Possibly, consider avoiding impacts to existing connections in Matrix, if compatible with Matrix objectives. Prevent stand replacement events such as intense fire; possibly consider delaying regeneration timber harvest in interior habitat or corridors, compatible with the needs for timber outputs.

In Matrix lands, if regeneration harvest avoids habitat that connect patches of interior late-successional forest in LSRs, the probability of maintaining population viability for older forest species increases. The

probability of maintaining species viability is improved by simply scheduling harvest in Matrix while considering the importance of older forest habitat connections.

Large Interior patches in Matrix*:* Possibly consider maintaining large patches older forests in Matrix. Possibly consider developing future large patches in Matrix by scheduling large areas of similar aged forest to develop into large patches of interior late-successional habitat. This can be accomplished by focusing harvest activities adjacent to existing sale units. These considerations are not intended to reduce the programmed amount of timber harvest in the matrix.

B. Priorities for Treatment

UPDATE NOTE: This section has not been reviewed by a Forest Ecologist.

To progress from existing conditions to desired conditions, in many cases, no action is needed. This is especially true in the large blocks of interior habitat not at risk. In these areas, the best management will be no rehabilitation activities except prevention of stand replacement fires (see below). Activities neutral to LSR objectives may still occur.

The effects to habitats of concern from not implementing salvage, reforestation, seeding, road treatments, meadow expansion, and meadow encroachment reduction are minor when compared to the effects of not implementing treatments that reduce the potential for future high intensity fires. Not implementing FMZs, especially high priority FMZs - and to some extent high priority landscape prescribed burning, would have the greatest adverse affect to late-successional forest habitat and associated species, because this would increase the probability of suppressing low intensity fires, which are beneficial to maintenance of this habitat. In addition, exclusion of low intensity fire increases the potential for high intensity fires over time, which increases the potential for losing late-successional forest habitat. The continued loss of late-successional forest habitat to high intensity fire could lead to local extirpation of species associated with this habitat. Priority would be to protect large blocks of late-successional habitat from severe fire.

Amount of Older Forests: In addition, the conditions of each LSR and within each LSR may influence the locations or priorities of projects. Focusing on the acceptable range of 45 to 70% (REAP 1993) for late successional conditions, the LSRs have the following order of priority for treatment (ranked highest to west) (Table 17). Within each LSR, areas in different plant series also have different priorities, based upon existing proportions of older forests.

Table 17: Priority of Treatments 1/

LSR	Existing LS Habitat (% of Potential)	Priority Plant Series for Treatment (Existing LS Habitat (% of Potential)
North Chetco	29	LIDE3 - 29%
West IV	29	LIDE3/Psme/Pije - 41%
Williams/ East IV	36	ABMAS - 24% ABCO - 37% LIDE3 - 39% LIDE3_PSME - 43% PSME - 43%
South Chetco	36	TSHE - 32% LIDE3 - 38%
Northwest Coast	38	LIDE3 - 33% LIDE3_PSME - 39%
Galice/Fish Hook	39	ABMAS - 37% ABCO - 39% PSME - 39% PSME_LIDE3 - 39% LIDE3_PSME - 46%

Table 17: Priority of Treatments 1/		
LSR	Existing LS Habitat (% of Potential)	Priority Plant Series for Treatment (Existing LS Habitat (% of Potential)
Taylor	46	PSME - 45% PSME_LIDE3 - 52%
Briggs	50	ABCO - 46% PSME_LIDE3 - 51% LIDE3_PSME - 56%

1/ Williams/East IV and Fish Hook/Galice LSRs. The Deer Creek 5th field analytical watershed is within the Williams/East IV LSR. There is no *P. lateralis* in this watershed. This should be one of two priority watersheds for POC. The other 5th filed watershed is Indigo creek in the Fish Hook/Galice LSR. Both of these watersheds should look at potential road closures to protect POC. If road closures are not appropriate, roadside sanitation should be undertaken in all areas that have POC in order to protect those POC away from the road.

Owl Activity Centers and Patch Sizes: Priorities for developing late-successional conditions needs to include the finer screens of habitat needs around spotted owl activity centers in large LSRs and the need to increase the size of large blocks of habitat. Home ranges for the northern spotted owl within the eight large LSRs are priority areas for accelerating development where the suitable habitat in any given activity circle is less than 50%, especially if less than 15 percent. Not included are the 100 acre Known Spotted Owl Activity Centers scattered throughout Matrix lands.

The managed stands in these areas are a higher priority for treatment. The agencies need to exercise caution when proposing projects within these activity centers. Stands may serve as foraging habitat, even though not suitable for nesting habitat. These stands should only be thinned if a short term loss of foraging habitat is acceptable. A focus on stands that the owls do not use would avoid these situations. The large blocks of interior habitat need also would benefit from additions of habitat from the surrounding areas. Map 12 displays managed stands that can be treated to accelerate the characteristics of older forests, adjacent to the blocks of interior habitat. The existing largest blocks of habitat are listed below (Table 18).

UPDATE NOTE: The existing block size and interior habitat columns have not been updated by the wildlife biologist to reflect the changes due to the Biscuit Fire.

Table 18: Largest Blocks of Total and Interior Habitat			
LSR	Plant Series	Existing Block Size (Acres)	Interior Habitat (Acres)
Williams/East IV	ABCO LIDE3 LIDE3_PSME PSME	Up to 6,375 Up to 2,300 Up to 1,100 Up to 8,100	<900 <400 <500 <2,590
West IV	LIDE3_PSME_PIJE	Up to 10,900	1,223
Briggs	ABCO LIDE3_PSME_PIJE PIJE PSME/LIDE3	Up to 1579 Up to 4100 Up to 1,800 Up to 8100	<100 <1,100 <100 <3,700
Galice/Fishhook	ABCO LIDE3 LIDE3_PSME PSME PSME_LIDE3 TSHE	Up to 2500 Up to 4300 Up to 21,600 Up to 3,800 Up to 20,740 Up to 6,603	<600 <700 <6,000 <1,200 <3,700 <300
South Chetco	LIDE3 TSHE	Up to 2,900 Up to 4,200	<579 <400
North Chetco	LIDE3	Up to 7,100	<2,300
Northwest Coast	LIDE3/PSME TSHE/LIDE3	Up to 9,500 Up to 14,800	<1,900 <9,200
Taylor	PSME PSME/LIDE3	Up to 2,000 Up to 2,100	<300 <300

The large blocks of large interior habitat at risk for stand replacement events such as fire and insects are priority areas for further examination. Overlays of maps 3, 10a, 11a, and 9 will help identify these areas.

Map 12: Candidates for Stand Treatment

C. Possible Projects

Using the trends listed above, several possible projects or activities could be feasible (Tables 19 and 19a).

Table 19: Possible Projects In LSR

Plant Series	Element or Process	Trend	Desired Trend	Possible Projects	Locations
All Series	Large Trees	Lack of Big Trees Due to Harvest	Grow Big Trees. Have more mature and over mature trees	PCT CT Fire Salvage Other Stand Tending Measures	Managed Stands
All Series	Large Trees	Large Ponderosa Pine and Sugar Pine is at risk	Keep PP & SP Healthy	Rx Fire Thinning From Below Density Mgt., Wildland fire Mgt., Keep some areas unmanaged - dying PP.	Wherever PP & SP exist. P 1. Less than 3500 feet elevation exposure within 1 mile of epidemic levels of beetle activity with a canopy closure of>70% 2. Less than 3500 feet in elevation with northern exposure within 1 mile of epidemic level of beetle activity with a canopy closure of > 70%
TSHE, CHLA, LIDE	Large Trees	POC disease killing large POC trees	Reduce Disease Spread	Site Specific Rx including such considerations as road closure season of operation sanitation and PCT measures.	Areas where POC occurs and areas where *Phytophthora* occurs.
CHLA, any locations where CHLA occurs	CHLA protection	POC disease killing large POC trees	Reduce Disease Spread	Sanitation along roads that remain open, eradication in all areas that have *P. lateralis*, commercial thinning, pre-commercial thinning, road closures or decommissioning, upgrading roads that need to remain open (surfacing and drainage) planting resistant stock, bough collection (as described above, recruiting down logs and snags, and using POC to create in channel structure for fish habitat. All projects require a monitoring component to determine effectiveness. Without monitoring, no project should be approved.	
All Series	Large Trees And Large Limbs	Increasing amount of Dense Stands, or Stands with Reduced Growth	Reduce density, Increase Growth, Increase Canopy Gaps. Provide Patchy Understory.	PCT, CT, RX Fire	Managed Stands or Natural Growth Rates (Stagnant)
All Series	Big Trees	High density stands at risk due to drought and fire.	Reduce Risk	Rx Fire. Single Story on Southern Slopes. Mult. Storied on N. Slopes	Areas with high rate of spread and high intensity fire potential.
All Series	Snags and LWM	Deficit in mgt. Stands & in past salvage areas. Potential Salvage Areas due to Disease/Insects/Fire	Provide more snags and LWM as specified for each plant series. Provide LWM	Retain and Recruit LWM & Snags in PCT and CT. Prescribe fire. Follow Plant Series Guidelines for LWM.	Managed Stands and Young Natural Stands. Where stand replacement disturbance exceeds 10 acres with <40% crown closure.
All Series	LWM In Streams	Deficit in critical areas	Provide more LWM & restore processes in upstream areas	Remove barriers to LWM movement. Examine road management needs. Manage in riparian reserves to produce big trees. No harvest of big trees in riparian reserves.	Focus on areas above fish flats.

Table 19: Possible Projects In LSR					
Plant Series	Element or Process	Trend	Desired Trend	Possible Projects	Locations
				Place Large Structure in Streams. Plant conifers in riparian areas. Prescribe fire in riparian areas.	
All series	Multi-canopy Layers	Lacking in younger stands	Provide for mc conditions	PCT and CT Rx for MC on North Slopes. Consider Underplant in created canopy gaps.	Managed stands and natural younger stands
All Series	Understory Trees	Lack of fire has left some understories overstocked.	Reduce Stocking	CT, PCT, or Rx Fire	High density stands
All series	Canopy Gaps & Patchy Understory & Closing of Canopy Gaps	younger stands - do not have adequate canopy gaps	Create Gaps	PCT, CT , or Rx Fire	Managed Stands and young natural stands
All series	Unique Habitat	Trees are encroaching meadows reducing valuable habitat nich. Maintain habitat for species such as *Frasera umpquensis*, *Pedicularis howellii*, and *Bensoniella oregana*. Trees are encroaching foraging areas for elk and deer	Provide Disturbance in Meadows Maintain adequate foraging areas congruent with older forest species' needs. Maintain historically open ridgetop meadows.	Rx Fire Girdling Mechanical Treatment May include removal of encroaching tree and shrub species. Rx Fire, PCT, CT forage seeding on closed roads.	Meadows as existed in 1940 or earlier (per estimates from 1940 aerial photos). All LSRs on closed roads and sites not capable of supporting older forest habitat.
PSME	Sophora leachiana	Lack of disturbance will decrease population levels	Provide disturbance	Rx Fire	Briggs and Taylor LSRs
All Series	Interior LS Conditions Connections & Buffering Of Microclimates	Patches and Connections are reduced in size leading to isolated reduced interior habitat.	Provide Increased Corridor & Patch Size Avoid stand replacement fires Increase corridor & patch size	Effective wildland fire suppression and the appropriate suppression response. Rx Fire PCT, CT & Fire Salvage	Large patches and corridors Large patches and corridors Non-habitat managed stands adjacent to existing interior habitat. Future habitat and corridors
All Series	Tree Growth	Restricted in high density stands	Reduce Density	CT PCT Rx Fire and Release	Managed Stands, High Risk Areas
All Series	DISTURBANCES, Including Wildland Fire And Prescribed Fire	less frequent/more severe	Keep fuel loading within historic variation by the use of fire	Rx Fire,Reduce fuel loading in high risk areas	High Risk Areas, Areas that have exceeded disturbance intervals.
All Series	Tree Establishment	mortality due to competition	Reduce Competition	PCT & Release	Managed Stands
LIDE3 and Oak Savanna Areas	Food For LS Species	Hardwood stands invaded by conifers due to fire suppression	Maintain hardwood and savanna conditions	Rx Fire mechanical treatment	All LSRs especially around Agness, and the elevations on the East IV and West IV LSRs
All Series	Storing Carbon	Large Woody Material lacking in streams and on the	Maintain and design needs for LWM per	Recruitment of Large Wood	Areas upstream from productive stream flats, managed stands, salvage areas

Table 19: Possible Projects In LSR					
Plant Series	Element or Process	Trend	Desired Trend	Possible Projects	Locations
		ground	table 20.		
Jeffrey Pine Series	Recycling Nutrients	Recycling From Fire is Absent	Reintroduce Fire	Wildland fire Mgt. & Rx Fire	West IV and Briggs LSRs. Smaller areas where Jeffrey Pine Series exists
All Series	Succession	Managed Stands have lack of some elements of succession	Reintroduce canopy gaps understory trees (more shade tolerant)	PCT CT	Managed Stands
All Series	Public Safety	Increased Fire Risk	Reduce Risk	CT PCT RX Fire	Near Human Communities (Takilma, Williams, Agness etc.) or Other High Risk Areas
All Series	Rare plants dependent on early successional habitat: Populations OUTSIDE the Biscuit Fire area.	Encroachment, population declines	Increasing population numbers	Prescribed fire or other disturbance to be used as habitat enhancement or regeneration tool	Haplopappus arborescens sites, Astragalus umbraticus sites, Arctostaphylos hispidula sites. Iliamna latibracteata sites and Sophora leachiana sites outside the Biscuit Fire area
All series	Rare plants occupying mid-successional, ecotonal, or special habitats that may occasionally need habitat improvement activities to maintain their presence in LSRs: OUTSIDE the Biscuit Fire area.	Various	Upward or stable population numbers and occupied acres	Prescribed fire or other disturbance to be used as habitat enhancement or regeneration tool	*Bensoniella oregana, Delphinium nudicaule, Erythronium howellii, Eucephalus vialis, Frasera umpquaensis, Leucothoe davisii, Lilium kelloggii, Pedicularis howellii, Sidalcea malvaeflora ssp. patula, Trillium angustipetalum, triteleia henderonii var leachiae sites* outside the Biscuit Fire area.
All series	Noxious Weeds and Nonnative Plants	Populations are Increasing	Decreasing Population	Control and Eradication of non-native plants and noxious weeds	Meadows, Unique Habitats, rare plant locations.
All series	Large trees snags and LWM; multi-canopy layers; understory trees; interior LS conditions connections & buffering of microclimates; etc	Major change in habitat due to more severe fire over large areas	Large block, low intensity fire	Use of Fuel Management Zones (FMZ) to compartmentalize wildland and prescribed fire	Primarily on ridgetops or along existing road systems across all land allocations other than Congressionally designated areas

Table 19a. Potential Landscape Rx Burning, by LSR	
LSR NAME	Acres Total
OUTSIDE LSR	8,866
BRIGGS	8,732
FISH HOOK	16,918
NORTH CHETCO	138
NORTHWEST COAST	28
WEST IV	4,302
Grand Total	38,983

VIII. Projects and Descriptions

Projects consist of prescribed fire, construction of Fuel Management Zones (FMZ), recruitment of large woody material and snag, silvicultural treatments, *Phytophthora* control, restoration of unique habitats, wildland fire, maintenance of lookout sighting corridors and other non-silvicultural activities.

A. Prescribed Fire and Wildland fire Hazard Reduction

A prescribed fire is a fire burning within an approved, pre-defined and planned prescription. It results from a planned or natural ignition. The use of prescribed fire restores processes that have been limited by effective fire exclusion.

One aspect of prescribed fire is wildfire hazard reduction. The goal of wildland fire hazard reduction in all land allocations is to reduce the risk and scale of large-scale, high intensity wildland fires that would prevent land managers from meeting resource management objectives. It is essential to seek a balance between reducing cost and reducing the risk of wildland fire, while promoting management objectives (Appendix B8, Fire Management Standards and criteria). Fuel Management Zones (FMZ) can be used to compartmentalize wildland and prescribed fire.

Prescribed fire can reduce the risks of wildland fire setting back the late-successional characteristics of the LSRs. In addition, it can produce elements such as canopy gaps, multistoried conditions, snags, and patchy understories needed for late-successional conditions.

Prescribed fire in LSRs or wildland fire use for resource benefit (if there is an approved Fire Management Fire Use Plan) is appropriate. Criteria for the use of prescribed fire are:

Responsibility for line officers: Forest Supervisors are responsible for considering the use of fire in the management strategy of all appropriate ecosystems, and especially those determined to be partially or totally fire dependent (FSM 5140.4, 5140.42). Prescribed burning may also be useful in the following land management activities:

a. Site preparation.
b. Control of undesirable understory including thinning.
c. Reducing activity and natural fuels that require treatment.
d. Vegetation management for range and wildlife habitat.
e. Control of certain insects and diseases.
f. Maintaining a certain successional stage.
g. Managing nutrient reservoirs and cycles for site productivity.

Documentation: The criteria for documentation are listed below. For management-ignited burns, a prescribed fire burn plan must be prepared and approved in advance (FSM 5142.1).

The prescribed natural fire plan must be prepared and approved before the use of a natural ignition as a prescribed fire (FSM 5142.23).

Air quality needs: Consider these seven items if prescribed fire is planned:

1) Describe alternative fuel treatments and reasons why they are not selected over prescribed fire.
2) Quantify the fuels to be burned (acres, tons, types).
3) Describe the types of burns
4) Describe measures taken to reduce emissions.
5) Qualify the amount of emissions to be released.
6) Describe the regulatory/permit requirements for burning.
7) Describe the air quality impacts of burning activities, focusing on new or increased impacts on down wind communities, visibility impacts in Class I Wildernesses, etc.

Burn Intensity: Keep as many large trees as possible, i.e., keep the percentage of the burned area below 15% in high intensity fire behavior and create snags, canopy gaps, and patchy understory for developing multiple canopy layers, large woody material, and future understory trees (use First Order Fire Effects Model, "FOFEM," to predict mortality rates and down wood material consumption).

Priority Areas for Treatment: Use prescribed fire in areas where the overstory is at risk due to an overstocked understory and in areas where the suppression of fires have lead to increased fuel loading and potentially extreme fire behavior or insect epidemics (high risk areas). Where these conditions exist adjacent to the valuable interior habitat areas in the LSR or those areas listed for protection under the wildland fire section, use prescribe fire to achieve LSR objectives by reducing the risk of unacceptable wildland fire behavior (would produce greater than 15% of the area burned in a stand replacement fire).

Prescribe fire on the Jeffrey pine plant series to simulate the historic fire frequency with which the plants evolved. In those areas, recycling of nutrients due to fire will provide historical conditions under which many of the rare plants evolved.

Prescribe fire on wildlife sites, especially meadows and oak/pine savannas, to maintain their habitat characteristics. Prescribed fire is an appropriate treatment of these small areas important for habitat diversity. Maintain the habitat for plant species, such as *Frasera umpquensis, Pedicularis howellii,* and *Bensoniella oregana,* which are dependent upon a meadow environment. Provide a low level of disturbance for the propagation of *Sophora leachiana* in the Taylor LSR.

B. Large Woody Material and Snags

UPDATE NOTE: This section has not been reviewed by a Forest Ecologist.

Large woody material and snags are important for both the aquatic and terrestrial environment.

Terrestrial: In projects where the amount of snags and large woody material can be affected, consider the following criteria (table 20). Recruitment of large woody material in managed stands via PCT and CT activities can provide future elements of the LSR habitat. In addition, any salvage projects in areas greater than 10 acres with a canopy closure less than 40% needs to implement the recruitment of snags and large woody material. Site-specific prescriptions for large woody material (LWM) for areas need coordination with the needs of wildlife, soils, silviculture, and fire.

LWM numbers in the table are minimum levels and exceeding them will often benefit the ecosystem. We know of no upper limits for retention of LWM. BLM area plans and Siskiyou Forest Plan Standard and Guidelines 4-13a-b, 7-8 and 7-10 provide details on quality, quantity, and dimensions of LWM.

Table 20: Large Woody Material and Criteria For Ecosystem Resilience (1996 LWM guidelines, updated 2001)

MINIMUM NUMBERS OF LWM PER ACRE TO BE RETAINED ON SITE		
	PRESCRIPTION	
Plant Series 2/	Stand Replacement Events Such As Fire With Salvage (numbers from Siskiyou NF LWM guidelines, Revised 2001) 1/ 4/	Non-replacement Events Such as Commercial Thinning
PIJE (sample 26) PIPO (PIMO)	1 Piece (Range = 1 to 3) OR 30 Cubic Feet, (Range = 0 to 180)	All Existing Down, Cull or Sound LWM, UP to 20 Pieces Per Acre 3/ 8-10% Ground Cover All Existing Snags at Each Entry
LIDE3 (sample 124) (SESE2)	10 Pieces (Range = 0 to 39) OR 1,000 Cubic Feet (Range = 0 to 3,400)	All Existing Down, Cull or Sound LWM, up to 20 Pieces Per Acre 3/ 8-10% Ground Cover All Existing Snags

Table 20: Large Woody Material and Criteria For Ecosystem Resilience (1996 LWM guidelines, updated 2001)		
MINIMUM NUMBERS OF LWM PER ACRE TO BE RETAINED ON SITE		
PSME (sample 28)	5 Pieces (Range = 0 to 15) OR 790 Cubic Feet (Range = 0 to 2,600)	All Existing Down, Cull or Sound LWM, up to 20 Pieces Per Acre 3/ 8-10% Ground Cover All Existing Snags
ABCO (sample 114)	10 Pieces (Range = 0 to 34) OR 970 Cubic Feet (Range = 0 to 2,845)	All Existing Down, Cull or Sound LWM, up to 20 Pieces Per Acre 3/ 8-10% Ground Cover All Existing Snags Keep all live trees where possible
ABMAS (sample 13) (TSME)	1 Pieces (Range = 0 to 4) OR 300 Cubic Feet (Range = 0 to 1,290)	All Existing Down, Cull or Sound LWM, up to 20 Pieces Per Acre 3/ 8-10% Ground Cover All Existing Snags
CHLA (sample 28)	21 Pieces (Range = 0 to 52) OR 3,700 Cubic Feet (Range = 0 to 8,800)	All Existing Down, Cull or Sound LWM, up to 20 Pieces Per Acre 3/ 8-10% Ground Cover All Existing Snags Keep all live trees where possible
TSHE (sample 28)	35 Pieces (Range = 0 to 80) OR 7,000 Cubic Feet (Range = 0 to 18,500)	All Existing Down, Cull or Sound LWM, up to 20 Pieces Per Acre 3/ 8-10% Ground Cover All Existing Snags Keep all live trees where possible

1/These sites would be greater that 10 acres and less than 40 % canopy closure (Northwest Forest Plan ROD, page C-14). Keep all live trees where possible.

2/Plant series, a good indicator of site quality and the plant environment is a reflection of soil quality, aspect, available water, climate and fire history. Tanoak (LIDE3), because of its wide range of occurrence is included in both middle and bottom rows of the table. PIPO ponderosa pine; PIJE Jeffrey pine; PIMO sugar pine; LIDE3 tanoak; PSME Douglas-fir; ABCO white fir; TSME mountain hemlock; ABMAS Shasta red fir; TSHE western hemlock; CHLA Port-Orford-cedar; SESE2 redwood.

3/Thinning stands - Quantity and quality of LWM and WRT are usually low in second growth forests. For LWM leave all existing down, be it cull or sound, up to 20 pieces per acre. These minimum amounts of LWM may be achieved in more than one entry.

4/A piece is defined as an average diameter of 20 inches and average length of 20 feet. Some or all of the LWM may be left standing; to reduce on-ground fuels; to prevent log rolling on steep ground; to provide wildlife habitat; and for safety or economic reasons. While it may be upright for a few decades, it will all come down eventually and contribute to site productivity in other ways.

At minimum, in all LSRs, the most common assemblage of woodpeckers on a given site is: downy woodpecker, red-breasted sapsucker, hairy woodpecker, northern flicker, and pileated woodpecker. The 100 percent habitat capability level for this group of woodpeckers is 3.1 wildlife trees per acre (continual supply over time) (Brown 1985). When a 10% implementation factor is added for trees that will be inadvertently lost during harvest operations, or because of burning or blowdown, then total trees needed per acre is 3.4. For sites in portions of all LSRs, the acorn woodpecker is also present; in these areas, the 100 percent habitat capability level is 4.2 (including 10% factor). For portions of the East IV LSR, the white-headed woodpecker is also present (but does not occur on the same sites as the acorn woodpecker); in these few areas, the 100 percent habitat capability level is 4.1 (including 10% factor). See pages Appendix C in the Draft EIS for the Biscuit Fire for current discussion on wildlife requirements for large wood and snags (pages C-35 – C-38). See also Appendix for Dead Wood Management in Final EIS for the Biscuit Fire.

Distribution and Quantity: Quantity of large woody material (LWM) recommended for each plant series group varies with our best estimate of site quality, the expected benefits to long-term site productivity and the estimated availability of LWM. A variety of decay classes (including class 1) and a variety of species

reflecting site conditions are best left onsite. Preferred distribution of LWM would be uniform over salvage areas or areas of consideration. Piece size should include some whole trees. Due to natural variability, availability, and topography, some areas will have more, some less than average.

Wildlife tree and snag densities must be provided within land areas generally no larger than 40 acres. Wherever possible, to provide for woodpecker territorial needs, dead trees should be left throughout the landscape; this provides the best opportunity to maintain LWM for long-term wildlife habitat and site productivity.

Aquatic: Large woody material is very important in streams, especially where the wood interacts with the low gradient streams with high fish diversity and production. Road management upstream of these low gradient "hotspots" needs to be examined for barriers to the movement of large woody material in the stream system. Upstream processes such as transportation of large woody material in streams also need to be restored. Much of the watershed restoration work targeted to improve water quality and spawning and rearing habitat for anadromous fish populations will be undertaken upstream of these low gradient stream reaches. Flats within these reaches will reflect the changes in watershed conditions e.g. fine sediment, large wood delivery, water temperature, pool quality.

These stream segments can serve as barometers of watershed health. Many of these segments are currently used by the Oregon Department of Fish and Wildlife or the Siskiyou National Forest as index areas for spawning salmon, e.g., Quotsatana Creek, Lobster Creek, Emily Creek, Dunn Creek, Grayback Creek, Taylor Creek, Johnson Creek, Rock Creek. Monitoring of these important aquatic/riparian habitats will help measure the success of watershed restoration work

Criteria. Criteria for this work includes:

Criteria for LWM and Projects:
1. Meet LWM guidelines for each plant series.
2. Hazard Tree Removal (ROD C-15)
    a. Examine the area (120' circle) surrounding each hazard tree (or each small group of trees). Estimate the existing umber of LWM pieces and compare to the minimum levels listed by plant series. Provide for the LWM needs on site (a distribution of amounts) that exceed the minimum LWM levels.
    b. Where excess LWM exists, merchantable portions of the hazard tree may be removed from the site. If LMW does not exist in adequate quantity, hazard trees may be harvested if the felled tree is still a hazard, and cannot be routinely handled to provide LWM. It may be that at a given hazard tree site, LWM minimum S&Gs are "almost" met before the addition of the hazard tree; in this case it may be appropriate to mark a portion of a hazard tree as commercially harvestable (example, 40'), and leave the rest of the tree on site. Adapt to changing circumstances as needed.
3. Upstream of critical stream reaches, remove artificial barriers to the movement of large woody material,
4. Examine road management needs in the watersheds above critical stream reaches,
5. Consider silviculture treatments in upstream riparian areas to accelerate the growth of large wood adjacent to streams.
6. Look at the amount of existing large wood in streams. Place instream structures where needed and where practical.

C. Silvicultural Activity

Many silvicultural activities can help achieve LSR objectives. Such activities include thinning, release, underplanting, limiting the understory, creation of snags, planting, and possibly fertilization.

Thinning: Direction from the ROD explains that any silvicultural manipulations proposed for Late-Successional Reserves have two principal objectives: "(1) development of old-growth forest characteristics including snags, logs on the forest floor, large trees, and canopy gaps that enable establishment of multiple tree layers and diverse species composition; and (2) prevention of large-scale disturbances by fire, wind,

insects, and diseases that would destroy or limit the ability of the reserves to sustain viable forest species populations." While prevention of large-scale disturbance is a general objective listed in the ROD for all of the range of the northern spotted owl, it is not always desirable in all ecosystems.

Periodic large-scale disturbances have historically been a part of the ecosystems of the Siskiyou Mountains. Periodic large-scale disturbances often provide the diversity of habitat conditions that are necessary to maintain species viability. Many acres inside the LSRs are young, managed stands created through past management practices. Silvicultural manipulation of these young forests can accelerate the development of some of the structural and compositional features of older forests. Direction in the ROD states that stand management inside of LSRs should focus on stands that have been regenerated following timber harvest.

The criteria for thinning inside of LSRs is developed to meet the above objectives and Forest Plan direction. The purpose of thinning projects is to reduce the stocking level within young plantations and managed stands, thereby improving species diversity within the stands and accelerating the development of late-successional forest characteristics. Thinning treatments provide the following benefits to the LSRs:

a. Thinning reduces competition:
    1. Trees grow larger and faster.
    2. Stands become more vigorous and less susceptible to insect and disease risks.
    3. Canopy conditions become more open and increase vertical variation by encouraging the establishment and growth of understory vegetation.
b. Thinning reduces uniformity and promote greater diversity:
    1. Species selection favors minor, under-represented species, including hardwoods, consistent with natural conditions for that plant series.
    2. Random spacing patterns, including un-thinned clumps within each stand, promotes spatial diversity. Openings that naturally occurred on these sites prior to management, such as wet areas and grassy openings, are restored where feasible.
    3. Spacing between POC should not be a one size fits all. The issue in spacing is the potential for root grafting and subsequent pathogen transfer through the grafts. Little is known about how far roots extend from individual POC. We do know that roots are a function of crown radius. Roots extend from 2 to 5 crown radii away from the bole of the tree. See comment number 23 above, which recommends a distance of 4 crown radii between leave POC (use the crown radius of the bigger tree when estimating the appropriate distance).

Analyze other opportunities for thinning. Thinnings focus on both conifer and hardwood species to encourage the development of diverse stands. Consider riparian areas for thinning (especially upstream of the productive "flats") if it meets the Aquatic Conservation Strategy. Analyze opportunities to reduce density through the use of prescribed fire.

An example thinning prescription for a pre-commercial sized plantation, generally between 10 and 20 years in age, reduces the density to approximately 175-225 trees per acre. Cut no trees over 8" dbh. Retain a hardwood component in the stand and thin hardwoods to promote their development. Leave an unthinned patch, approximately 1/4 acre in size, for every five acres treated to increase structural diversity.

Favor minor species for retention in the thinning to promote species diversity. Do not cut any Pacific yew or dogwood. Leave all snags and down woody material in place. Do not use skidders or harvesters and thin with chainsaws. Address the increased fire hazard created by the treatment and incorporate hazard reduction measures such as hand piling into the thinning prescriptions.

Thinned stands will require sufficient stocking to maintain future options and to ensure the sites maintain desired vegetative objectives. Too much thinning may eliminate some future options, provide a site not fully occupied, and promote ingrowth of undesired vegetation. Monitoring determines if additional entries are needed at a later date to achieve late-successional objectives. These entries include additional thinnings, underplanting of native tree and shrub species, and fertilization, if needed. Long-term management includes the development of snags, down woody material and defect to accelerate stand

structure and complexity. Entries in LSRs are intended to be infrequent. Consequently, design initial entries to have long lasting effects to minimize the need for additional entries.

Commercially thin stands when they achieve a relative density of 60-70% or greater of the biological maximum density. Thin to stocking levels that promote the development of late-successional characteristics (canopy gaps, multistoried, some large limbs, etc.). Leave the most dominant trees along with the co-dominant and intermediate trees necessary for structural diversity. Maintain all species on site.

Other considerations: Develop thinning prescriptions by major plant series. For example, in tanoak series forests, aggressively thin tanoak more so than in the western hemlock series forests. Thin drier sites such as pine series forests to wider spacing than more moist sites such as white fir series forests.

Do not thin in owl habitat inside Known Spotted Owl Activity Centers (ROD page C-10), unless essential for the owls. These 100 acre LSRs constitute protective buffers for owl activity centers which would otherwise be located in Matrix. Use seasonal restrictions when projects are within one-quarter mile of a known nest tree or activity center. For spotted owl activity centers in the eight large LSRs, priority 1 are sites containing less than 30 percent suitable habitat within their home ranges. Priority 2 are those sites between 30-40 percent. Priority 3 are those sites at 40 percent or more.

Watershed analysis may indicate that certain levels of dense, single-layered stands are desirable landscape components to meet other resource objectives. Achieving this objective could alter the thinning prescription or result in some managed stands not being thinned.

Address Port-Orford-cedar root disease management objectives wherever Port-Orford-cedar is present. This could alter the thinning prescription for those sites. Multi-layered stands provide ladder fuels that add to fire hazard. Consider developing or maintaining multi-layered canopies on northern aspects to achieve fire management objectives in high-risk areas.

Manage southern aspects to incorporate disturbance considerations and favor predominately single layer stands. Consider priority areas where existing size of interior habitat can be increased. Accelerate the development of managed stands inside or adjacent to these blocks to improve the quality of the interior habitat.

Release: Release of trees from the competition of surrounding vegetation can help establish trees and increase tree growth. The following criteria are important considerations for release:

a. Treat managed stands where the conifer component may not survive due to competition from other vegetation.
b. Treat managed stands where the vegetation will not develop without release.
c. Apply the same criteria for retaining minor species, such as dogwood, as described for thinning prescriptions.
d. Treat activity fuels.

Underplanting: Underplanting can be important for creating multiple canopy layers, especially in managed stands. Underplanting as part of the thinning prescription of managed stands or stagnant stands accelerates the development of canopy layers. Criteria for underplanting include:

a. Emphasize northern aspects with LIDE3 plant series or anywhere where TSHE, ABCO, ABMAS, or CHLA plant series exist.
b. Emphasize species mix normally found in the multiple canopy layers, such as hemlock, western red cedar, dogwood, etc. that is suitable for the appropriate plant series.
c. Where appropriate, plant resistant improved stock of Sugar Pine, Western White Pine and Port-Orford-cedar to assure the presence of these species in future stands.

Limiting understory: Limit the amount of understory vegetation to prevent stagnant stands, or to protect stands at high risk of fire and/or insects/disease. Criteria for this treatment are:

a. Emphasize density management of the understory where the overstory ponderosa pine, white pine, or sugar pine is at risk to active beetle attack.
b. Emphasize management of the understory where fire suppression has left ladder fuels in areas of high fire risk (such as southern slopes).
c. Treat areas of high value first (adjacent to large interior blocks of habitat, or other areas listed on table 21).
d. Maintain natural hardwood distribution and abundance.

Creation of snags and large woody material: The creation of snags in managed stands provides a missing element of late-successional forests. The recruitment of large woody material, including snags, will be a part of every thinning prescription, where appropriate.

Reforestation: Reforest existing disturbances and future disturbances to accelerate the development of big trees and late successional habitat. Criteria for reforestation are:
a. All managed stands will have adequate reforestation (125 trees per acre).
b. Disturbance events of greater than 40 acres with less than 40 percent canopy closure will be reforested with a mix of indigenous species, appropriate to that plant series.

D. POC *Phytophthora* Control

The control of *Phytophthora* keeps large POC trees from dying. Appropriate criteria for *Phytophthora* control are:

1. Environmental analysis for any projects in areas with POC (includes access and egress routes) will include a *P. lateralis* control strategy.
2. Project design criteria for work in POC areas must include a determination of whether or not the area has root disease. Uninfested areas will be treated prior to infested areas. Most work should be limited to the dry season. Exceptions can be made for prescribed fire or in emergency situations, which will have to be decided on a site-specific basis. This does not mean that no precautions should be taken. Only that working in the wet season may be necessary to meet prescribed fire or other management objectives. For wet season operations, unit scheduling (treat uninfested areas first, then infested areas), vehicle washing (before entering uninfested areas and before leaving infested areas), designation of access and egress routes or other measures should still implemented.
3. Add POC treatments to records for treated unit.
4. Bough collection should be permitted as a byproduct of LSR management. However, harvest should only be permitted when bough collection is accomplished via permit (negotiated contracts or by bid), requiring dry season operations (June through September), designation of access and egress routes, designation of parking areas, unit scheduling (collect all uninfested areas prior to infested areas), washing of boots and equipment, daily inspections, and easily identifiable areas where boughs are to be collected. If these conditions cannot be met, then no bough harvest shall be permitted. No other special forest products permits will be issued where Port-Orford-cedar is present unless administration described above can be implemented.
5. Vehicle washing areas should be at entry/exit points of the road system with Federal control. Washing areas should be situated so that runoff does not enter stream channels, ditch lines, or areas with POC. Washing areas should be mapped and recorded in a GIS layer so that they can be used in the future. Each road system that accesses areas with POC should have at least one washing area designated. Vehicle washing should take place as close as possible to infested sites. Ideally, vehicles should not travel for any substantial distance prior to being washed. Vehicles moving into uninfested areas may be washed miles away as long as they do not travel through infested areas to reach their destination. An evaluation to test the effectiveness of a vehicle washing treatment was conducted by the Southwest Oregon Forest Insect and Disease Service Center (SWOFIDSC) in June, 1999 (Goheen et al. 2000). Results indicated that there were large reductions in inoculum on the vehicles following washing.
6. Map water sources to show presence or absence of *P. lateralis*. Utilize uninfested water sources for planned activities such as road watering and other water distribution needs, or treat water with Clorox (Ultra, Institutional, as per label) to prevent the spread of *P. lateralis*.

7. As part of roads analysis, determine if areas with POC still require road access.
8. Where POC is concentrated within stream courses, road drainage should be designed to disperse water away from streams.
9. Locate and design waste areas so they do not spread *P. lateralis* spores. Use only approved waste areas if material must be transported.
10. Limit road construction and maintenance to the dry season (June through September). Minimize operations during periods of heavy rain regardless of time of season. However, this will not prevent the opening of plugged culverts or ditches or other maintenance when the need arises during periods of heavy rain.
11. Access to the project area should be along routes with least occurrence of infection sites.
12. Use eradication and prescribed fire as management tools in areas with *P. lateralis*. Eradication is the killing of live POC in areas that have *P. lateralis*. Eradication distances will be a function of the crown radius of the infected tree. All healthy looking POC within three crown radii from the last infested tree will be killed. Removal of the tree is not required but may be necessary to allow for prescribed fire application. Port-Orford-cedar treatment areas should be treated as soon as possible after regenerating POC reach a height of 6 inches above ground level. This treatment should be incorporated into routine management such as roadside brushing, young stand management treatments, and pre-commercial thinning.
13. Eradication treatments may include the commercial harvest of POC products.
14. Eradication treatments can serve as a source for large wood used in aquatic habitat restoration. However it can also serve as a source for *P. lateralis* spores into the stream channel.
15. Monitor for effectiveness of treatments. Monitoring can be at varying levels of intensity. Monitoring can include photo points of treated areas (pre and post treatment), formal plots (number of trees before and after sanitation or eradication treatments), or walk through inventory.
16. Route new trails (OHV, motorcycle, mountain bike, horse, and foot) away from areas with POC or *P. lateralis*. Established trails should be re-routed in the same manner where trails present risk to POC.
17. Sanitation is the removal of live POC in areas without *P. lateralis*. Use sanitation to protect POC populations along roads that remain open during the wet season. Sanitation treatments may include the commercial harvest of POC products. Sanitation area width is recommended to be a minimum of 25 feet above the road or to the top of the cut bank. Below the road, recommended minimum width of 25 to 50 feet.
18. Sanitation treatments can serve as a source for large wood used in aquatic habitat restoration.
19. Utilize resistant stock for reforestation. During calendar year 2002, 1.75 million resistant seed was produced and is available for reforestation in parts of the native range of POC; primarily the northwest portion of the range. Additional resistant seed will become available in the future for other portions of the range.
20. Thinning treatments should break up POC continuity across thinning units. Spacing should be a minimum of four crown radii between leave POC.
21. Emphasize management of POC on sites where conditions make it likely that they will escape infection by *P. lateralis*, even if the pathogen has already been established nearby or may be introduced in the future. POC is favored above roads, uphill from creeks, on ridge tops, and on well-drained sites. Emphasis may include priority retention during thinning or other silvicultural treatments, and planting to increase the presence of POC in areas unfavorable to the pathogen.
22. The Brewer Spruce Research Natural Area (Williams LSR) is a variation of the Port-Orford-cedar/Shasta Red Fir/Brewer Spruce/Sadler Oak-Huckleberry oak. This plant community also contains Alaska Yellow Cedar. When POC in this community were tested for resistance to *P. lateralis*, approximately 60% (18 out of 29 trees) of the tested trees were considered resistant and have been incorporated into the resistance-breeding program. No roads or trails should be constructed through this area. POC issues are secondary priority during wildland fire suppression. While management objectives.

POC outplanting is another technique used to combat POC root disease. Table 20a displays locations where this work can be done.

Table 20a. POC outplanting sites: It is impossible to tell from the maps in the LSR assessment, the exact legal descriptions of all the LSRs. Attached is a list of all outplantng sites. At some future time, we will need to go over every site and determine which ones are within LSR boundaries and which ones are not.

Organization	Planting Site Name	T	R	S	Lat	Long	Date Planted	Assessment Dates					Comments
BLM Medford District	Bill Creek 2000	39s	6w		42.1783	-123.3550	3/28/2000-3/30/2000	Oct-00	Jun-01	Oct-01	Jul-02		
BLM Medford District	Bill Creek 2002	39s	6w		42.1783	-123.3550	2001						
OSU	Botany Farm				44.5644	-123.2447	1989	1999					
BLM Roseburg District	Burma	29s	8w		43.0667	-123.6917	Feb-01	Jan-02					
BLM Roseburg District	Camas Valley 1998				43.0125	-123.4457	Mar-98	Apr-98	Oct-98	Apr-99	Sep-99	Aug-02	
BLM Roseburg District	Camas Valley 1999				43.0125	-123.4457	1999	May-99	Nov-99	Aug-02			
BLM Roseburg District	Camas Valley 1999 Demo				43.0125	-123.4457	Mar-99	Jun-00	Oct-01	Aug-02			
BLM Roseburg District	Camas Valley 2000				43.0125	-123.4457	Feb-00	Jul-00	Oct-00	May-01	Oct-01	Aug-02	
BLM Roseburg District	Camas Valley 2001				43.0125	-123.4457	Jan-01	May-01	Oct-01	Aug-02			
Coos County	Coos County				43.2700	-124.3417	Feb-01	Apr-01	Jan-02	Sep-02			
USFS Region 5	Fish Lake	10n	4e		41.2517	-123.6900	Apr-01	Sep-01					
USFS Powers RD	Flannigan	32s	12w		42.8083	-124.1050	Mar-93	see comments					Assessed: 5/93,7/93,10/93,5/94,10/94,10/95,5/96,10/96,5/97,3/98,4/99,7/99,7/00,7/02
USFS Powers RD	Foggy Eden 2001	32s	10w		42.8017	-123.8883	Mar-01	Sep-02					
USFS Powers RD	Foggy Eden 2002						Apr-02	Sep-02					
Private	Hiouchi				41.7936	-124.0725	Mar-00	Jun-00	Oct-00	May-01	Oct-01	Apr-02	
Private	Menasha Corp.	28s	14w	12	43.1567	-124.3122	Feb-02	Sep-02					
BLM Roseburg District	Middle Creek	31s	6w		42.8317	-123.4167	Feb-02	Oct-02					

Table 20a. POC outplanting sites: It is impossible to tell from the maps in the LSR assessment, the exact legal descriptions of all the LSRs. Attached is a list of all outplantng sites. At some future time, we will need to go over every site and determine which ones are within LSR boundaries and which ones are not.

Organization	Planting Site Name	T	R	S	Lat	Long	Date Planted	Assessment Dates					Comments
Private	Moore Mill Co.	31s	14w	30	42.8517	-124.4083	Feb-02	Sep-02					
USFS Illinois Valley RD	Page Mtn 1999 Demo	41s	7w		42.0183	-123.5717	Mar-99	Jul-99	Jun-00	Oct-01			
Private	Plum Creek Corp.	32s	13w	10/15	42.8083	-124.2267	Feb-02	Sep-02					
USFS Gold Beach RD	Quosatana 1993	36s	13w		42.4300	-124.2517	Mar-93	see comments					Assessed: 5/93,7/93,10/93,5/94,10/94,10/95,5/96,10/96,5/97,3/98,4/99,7/99,7/00,7/02
USFS Gold Beach RD	Quosatana 1998	36s	13w		42.4300	-124.2517	Mar-98	Apr-98	Nov-98				Assessments discontinued because the few remaining trees were no longer tagged
USFS Gold Beach RD	Quosatana 1999 Demo	36s	13w		42.4300	-124.2517	Mar-99	Jul-99	Jun-00	Jul-02			
OSU	Raised Beds 2002				44.5689	-123.2780	Mar-02						
BLM Medford District	Sucker Creek	40s	7w		42.1200	-123.4733	Nov-01	Sep-02					

E. Unique Habitat Restorations

Meadow and oak savanna habitat in the late-successional reserves are important elements for some rare plants and habitat diversity. Maintenance of these areas ensures this habitat continues to function and provide biological diversity. Though the maintenance of this habitat is contrary to late-successional conditions, the limited area, arrangement, and importance of this habitat niche does not adversely impact the objectives of the late-successional reserves, and does improve ecosystem resilience by increasing diversity. In all LSRs, these meadow habitats comprise less than 2% of the land area and often do not have the potential to grow late-successional forests.

Several criteria for oak savanna and meadow restoration and maintenance are:

1. Remove encroaching trees and undesirable exotic vegetation from meadows and savannas.
2. Leave or girdle large, live trees within savannas and meadow areas, depending on individual circumstances. Removal of tree excess to habitat needs may be necessary to meet objectives.
3. Restore savannas and meadow areas lost to encroachment to their former size. This restoration affects the removal of some vegetation that has encroached upon meadows.
4. Siskiyou National Forest 1940 aerial photographs provide a 55 year "look back" for meadows, for most of the LSRs (including some BLM portions). These photos provide a "picture" of how meadows fit the landscape at a time when fire suppression was beginning to take hold. Estimated acres of meadow would increase by 100 percent.
5. Reduce exotic species populations of gorse, scotch broom, and purple loosestrife.

Address elk habitat needs. As foraging areas grow into hiding and thermal cover, maintain existing forage areas. Criteria for these projects include:

1. Minimize effects on older forest habitat by maintaining forage for a longer period of time in managed stands by opening up canopy gaps.
2. Use prescribed fire in natural stands to maintain quality forage and micro openings in the forest canopy.
3. Seed high quality forage where needed on closed roads and other potential seed beds, such as marginal or low productivity sites on ridge tops (Silver Creek to Peavine Mountain area on Galice portion of Fish Hook/Galice LSR).

F. Wildland Fire

The Forest Service and BLM policy for fire suppression is to conduct fire suppression in a timely, effective and efficient manner with a high regard for public and firefighter safety. Respond to each wildfire ignition in a timely manner with appropriate forces, based upon established fire management direction as documented in approved Forest plans, Resource Management plans, and Fire Management Plans (FSM 5121). A wildfire is any wildland fire that does not meet management objectives, and, thus requires an appropriate suppression response. The appropriate suppression response (in terms of kind, amount and timing), on a wildfire most efficiently meets fire management direction under current and expected burning conditions. The response ranges from a strategy of prompt control at the smallest acreage possible to one of containment or confinement. Control human caused fires at least cost commensurate with the resource values at risk. Each fire that escapes initial attack, the responsible line officer conducts a Wildland Fire Situation Analysis (WFSA) evaluating initial suppression action on each uncontrolled wildland fire following the first burning period. Review and daily validate the WFSA prior to each subsequent burning period.

Wildland fire can set back the elements for late-successional forests or can favorably influence the forest's resiliency, depending upon the fire's behavior. For example, a very intense fire burning in a high fuel area can burn up late-successional habitat. A low intensity fire in a low fuel area can accelerate such late-successional elements as canopy gaps, patchy understory, and a healthy overstory (use First Order Fire Effects Model-FOFEM, to determine mortality rates and down woody material consumption).

The following criteria provide a quick reference to the sensitive issues related to fire suppression and LSRs. These areas are associated with critical habitat, nesting seasons and other critical and sensitive issues.

Spotted Owl. Nesting period; 3/1 - 9/30, protect nest sites during critical nesting period (3/1 – 6/30) as in following table. Low intensity fire is beneficial to habitat, except in the immediate nesting area. High intensity fire is damaging (see USDA FS/USDI BLM 2003).

Type of Activity – for Spotted Owl	Zone of Restricted Operation
Blast of more than 2 pounds of explosive	1 mile
Blast of 2 pounds or less of explosive	360 feet
Impact pile driver, jackhammer, or rock drill	180 feet
Helicopter or single-engine airplane	360 feet
Chainsaws (hazard trees, tree harvest, etc.)	195 feet
Heavy equipment	105 feet

Marbled Murrelet. Nesting period; 4/1 - 9/15 protect nest sites from noise disturbance during critical nesting period (3/1 – 8/5) as in following table. Habitat Protection; Low intensity fire is beneficial to habitat, high intensity may be damaging (see USDA FS/USDI BLM 2003).

Type of Activity – For Marbled Murrelet	Zone of Restricted Operation
Blast of more than 2 pounds of explosive	1 mile
Blast of 2 pounds or less of explosive	360 feet
Impact pile driver, jackhammer, or rock drill	300 feet
Helicopter or single-engine airplane	360 feet
Chainsaws (hazard trees, tree harvest, etc.)	300 feet
Heavy equipment	300 feet

Peregrine Falcon. Work activities should not take place within the primary or secondary nest protection zones of known peregrine falcon nests during restriction periods established in draft or final site management plans. These dates are site specific, per individual site management plan. Use draft or final management plans for additional site-specific guidance. If a draft or final management plan has not been written, management guidelines should reflect maximum nesting restriction periods and corresponding spatial protection until additional site specific information can be collected or applied. January 1 is the earliest start date for the restricted activities within primary and secondary protection zones at any nest site; the latest end date for any nest site is August 15, and are dependent on the elevation of each nest site (see USDA FS/USDI BLM 2003).

Bald Eagle. Protection period; 1/1 - 7/31 Work or other activities above ambient noise levels that cause disturbance, including helicopter use, logging, and construction would not take place within 0.25 mile (approximately 400 m) of *active* nests/roosts (not line of site) or within 0.5 mile (approximately 800 m) (line-of-sight) from nests/roosts during periods of eagle use, unless surveys demonstrate that the nest or roost is not being used, or use of the site has ended for the year. Critical nesting periods generally fall between 1 January and 31 August. Habitat protection: low intensity fire is beneficial to habitat, high intensity is damaging (see USDA FS/USDI BLM 2003).

Salmonid Habitat Protection

- Minimize use of heavy equipment in stream courses
- Protect stream from fuel contamination by use of fuel barriers
- Consider the use of wet lines near stream courses
- Minimize fireline construction near stream courses
- Use erosion control on constructed firelines over 20% slope
- Minimize burnout in riparian zones

  Limit contamination of stream with retardant or foam

Areas Requiring Higher Protection. Several areas need protection from extreme wildland fire behavior (stand replacement exceeding 15% of the area burned). High priority areas include sites where high severity burns have significantly reduced the amount of late successional habitat. In general, older forest patches and connections with interior habitat, spotted owl activity centers, murrelet activity centers, and riparian areas in watersheds with high anadromous fish populations need protection. Some specific areas are listed in table 21.

Table 21: Areas Requiring Higher Levels of Protection*

Late-Successional Reserve	Items of Interest	Locations
BRIGGS	Older Forest Patches Spotted Owl Activity Centers	Illinois River Corridor
EAST IV/WILLIAMS	Older Forest Patches, Spotted Owl Activity Centers, Riparian Connections, Oregon Caves	Sucker/Grayback Drainage
	Rural/Urban Interface	Williams and Takilma
	Alaska Yellow Cedar	There are at least 2 populations in the LSR. One near Kerby Peak and one at Rabbit Lake.
FISH HOOK/GALICE	Alaska yellow cedar areas	Elk Wallow
	Western Red Cedar areas	North Fork Silver Creek Watershed
	Habitat Connections	Lawson Creek and the Illinois River to the Northwest Coast LSR; Foster Creek where it connects with NW Coast LSR; Silver, Shasta Costa and Indigo roadless areas; Matrix land around Fish Hook Pk.
	Encalypta (rare moss) site	Southwest of Squirrel Peak
	Recreation Sites & Views	Wild & Scenic Rogue River Corridor
	Peregrine Falcon Area(s)	
WEST IV	Block of western hemlock	Granitic intrusion west of Oregon Mountain
	Habitat Connections	Tunnel Area by Highway 199
SOUTH CHETCO	Coastal Redwoods	Emily Creek, Chetco River, Winchuck River, and Wheeler Creek
	Murrelet Habitat	Northern aspects along streams with big trees
	Recreation Values	Wild and scenic Chetco River corridor
	Rural Interface	Winchuck River Winchuck and Chetco River Valleys
NORTH CHETCO	Habitat Connections	Riparian Zones: Lawson Creek to the Illinois River
	Recreation Values	Chetco River

Table 21: Areas Requiring Higher Levels of Protection*		
Late-Successional Reserve	Items of Interest	Locations
NORTHWEST COAST	Late Successional Habitat	Elk River drainage; Coquille River corridor; Hall Creek, Quosatana Creek
	Recreational Values	Scenic Rogue River, Coquille River, Elk River
	Peregrine Falcon Areas	
TAYLOR	Critical anadromous fish habitat; stairstep characteristics; riparian reserves	Taylor Creek to southwest
	Recreation Values	Sites along Creek
	Oregon's largest *Cypripedium fasciculatum* population	Location on file.

*Specifically look at protection for occupied murrelet habitat, known spotted owl activity centers, and connectivity corridors.

POC issues are secondary priority during wildland fire suppression. While management objectives for Port-Orford-cedar are a concern, safety of firefighters and the public, as well as protection of property or protecting the fire line is always a higher priority. When practicable, management strategies to prevent spread of *P. lateralis* shall be incorporated into firefighting activities.

G. Other Non-silvicultural Activities in Late-Successional Habitat

The Northwest Plan specifically states that non-silvicultural activities neutral or beneficial to the creation and maintenance of late-successional habitat are allowed. These projects are discussed below.

Genetic Developments and Research. The "Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl" (S&G) page C-17 states: Existing developments in Late-Successional Reserves such as campgrounds, recreation residences, ski areas, utility corridors, and electronic sites are considered existing uses with respect to Late-Successional Reserve objectives, and may remain, consistent with other standards and guidelines. Routine maintenance of existing facilities is expected to have less effect on current old growth conditions than development of new facilities.

Maintenance activities may include felling hazard trees along utility rights-of-way, trails, and other developed areas." On April 17, 1995 Ken Denton, Regional Office Issues Resolution Team, sent out direction which stated: "evaluation plantations are considered existing developments under S&G page C-17, not 'silvicultural' activities, and you should continue to maintain them per budget advice, ...continued maintenance of existing evaluation plantations - typically fenced, staked trees, historically maintained to evaluate the performance of different genetic parents, and so forth, should be treated as existing developments.

On Page C-18 and C-19 of S&G, research activities are addressed. It states: "A variety of wildlife and other research activities may be ongoing and proposed in late-successional habitat. These activities must be assessed to determine if they are consistent with Late-Successional Reserve objectives. Some activities (including those within experimental forests) not otherwise consistent with the objectives may be appropriate, particularly if the activities will test critical assumptions of these standards and guidelines, will produce results important for habitat development, or if the activities represent continuation of long-term research.

These activities should only be considered if there are no equivalent opportunities outside Late-Successional Reserves." It goes on to say: "Current, funded, agency-approved research that meets the above criteria is assumed to continue if analysis ensures that a significant risk to Aquatic Conservation Strategy objectives does not exist." The Siskiyou National Forest has 67 evaluation plantations (E.P.s) to test the genetic potential of selected trees to transmit their growth and form characteristics to their progeny. Sixty-six of them are testing Douglas-fir, and one is testing sugar pine. Of these, 37 are located within LSRs (Appendix B).

The Grants Pass and Glendale Resource Areas have 33 evaluation plantations. Ten are located in the LSRs (Appendix B). The size of each Douglas-fir plantation is about 10 acres, and all have been fenced to reduce wildlife damage. Some of the fences have been removed. The plantations range in age from 7 years to 18 years from seed. They were all planted at close spacing of 8' x 8' or 9' x 9', and all the planting was done on a grid. The trees in the older plantations are quite large (over 10 meters tall when measured at 15 years), and the crowns have grown together. The trees radial growth is being retarded by the intense competition.

The sugar pine evaluation plantation is 4 acres in size, and is 12 years old. All of the evaluation plantations require much maintenance in the form of brush cutting to keep the test trees free from competing vegetation. As the E.P.s finish their measurement sequences, they are planned for thinning to prevent stagnation, and in some cases to retain some selected genetic individuals.

The Siskiyou National Forest has 12 seed orchard sites to produce frequent, abundant, and easily harvested crops of seed from trees that exhibit improved growth and form characteristics. Of these, 11 are partially or totally within LSRs. The size of the seed orchards ranges from 7 acres to 12 acres. They range in age from 5 years to 13 years. The Medford BLM Area has two seed orchard sites, both are outside of LSRs.

Trees are still being planted in some of the orchards. Most of the orchards were planted at 20' x 20' grid. Three of the Douglas-fir and both of the sugar pine seed orchards have grafted trees at the grid locations. The remaining Douglas-fir orchards have clusters of 9 seedlings planted at each grid location. Many of the 9 tree clusters have not been thinned to the best individual at each grid location. Maintenance is routinely needed to keep unwanted vegetation, both grass and natural seeded trees, down in the orchards.

The Siskiyou National Forest has two sugar pine and one redwood common garden test sites to test the climatic adaptability and genotype-environment interaction of seed sources from the whole range of the species. These three sites are within LSRs. The size of the sugar pine sites is 6 acres, and the size of the redwood site is 4 acres. The sugar pine and redwood trees are 8 years old. The sugar pine trees were planted at 2.25 x 2.25 meters on a square grid and the redwood trees were planted on a 3 m x 3 m grid.

These three test sites require much maintenance to control competing vegetation, and as the trees grow and fully occupy the site, pre-commercial thinning of selected individuals will be required. The Siskiyou National Forest is in the process of preparing sites for two Port-Orford-cedar (POC) common garden test sites. The test sites will test the genetic potential of POC from its entire range, much like the sugar pine test. They are being located in two abandoned seed orchard sites, each about 7 acres in size. The seed orchards are not now needed due to the greatly reduced seed needs, and the common garden test required a uniform site that the seed orchard sites provide. They will be planted in the spring of 1996 as 1-year-old seedlings from seed. Here again, much maintenance will be required to control competing vegetation, and to precommercial thin selected individuals not needed for the test.

Maintenance of the evaluation plantations, seed orchards, and genetic test sites will have no effect on current old-growth conditions, and will create no risk to Aquatic Conservation Strategy objectives. Given: 1) the small areas of the evaluation plantations, orchards, and test sites; and 2) that they will not contribute to late-successional characteristics of the LSRs until at least 50 years in the future. These activities will not impair the objectives of the LSRs.

Special Forest Products. The Standards and Guidelines for the Northwest Forest Plan page C-18 states: "Special Forest Products include but are not limited to posts, poles, rails, landscape transplants, yew bark, shakes, seed cones, Christmas trees, boughs, mushrooms, fruits, berries, hardwoods, forest greens (e.g., ferns, huckleberry, salal, beargrass, Oregon grape, and mosses), and medicinal forest products. In all cases, evaluate whether activities have adverse effects on Late-Successional Reserve objectives.

Sales will ensure the resource is sustainable and protection of other resource values occurs such as special status plant or animal species. Where these activities are extensive (e.g., collection of Pacific Yew bark or fungi), it will be appropriate to evaluate whether they have significant effects on late successional habitat. Restrictions may be appropriate in some cases."

In 1994, the harvest of special forest products included the following products, amounts, and values on the Siskiyou National Forest (table 22). The quantity of these products removed in any given year will vary. For example, the amount of arrow-wood may vary from 0 to 250 cords sold annually.

Table 22: Special Forest Products

Product	Quantity	$ Value
Arrow wood	12 cords	180
Beargrass	12200 lbs	1051
Boughs	48 tons	1,452
Burls	11400 lbs	1,160
Christmas trees	2481 each	12,405
Cones	20 bushels	10
Ferns	21400 lbs	1,070
Firewood commercial	345 cords	2,375
Firewood person	1139 cords	5,630
Misc. greens	17785 lbs	664
Mushrooms	1267 permits	49,100
Oregon grape	500 lbs	25
Other convertible	73 mbf	9,597
Other non-convert.	1293 lbs	204
Poles	7282 lineal ft.	364
Posts	420 each	310
Salal	36140 lbs	1,821
Sawtimber	3 mbf	356
Seedlings/transpl.	16,500 each	1,870
Total permits sold	21,372	89,645

The harvest of most of these products will have no effect on late-successional habitat. However, intensive harvest of mushrooms could have effects on habitat. Long term studies have not been done on mushroom harvest, but high harvest levels could affect their local population viability, food chains of small animals, and endangered or sensitive plant and animal species and their habitat.

The harvest of these products is consistent with LSR objectives where the resource is sustained and late successional habitat is protected. All of the products except mushrooms are clearly visible and their harvest will not affect old-growth habitat.

Harvest of mushrooms may conflict with LSR objectives where local populations are limited compared to the number of permittees in the area. Mushroom harvest will also conflict with LSR objectives when food chains of special status species are disrupted, or when the habitat of these species is threatened. Mushroom harvest will be monitored to ensure populations remain viable, and some mushrooms may be listed on Table C-3 - Species to be protected through survey and management standards and guidelines.

Bough collection should be permitted as a byproduct of LSR management. However, harvest should only be permitted when bough collection is accomplished via permit (negotiated contracts or by bid), requiring dry season operations (June through September), designation of access and egress routes, designation of parking areas, unit scheduling (collect all uninfested areas prior to infested areas), washing of boots and equipment, daily inspections, and easily identifiable areas where boughs are to be collected. If these conditions cannot be met, then no bough harvest shall be permitted. No other special forest products permits will be issued where Port-Orford-cedar is present unless administration described above can be implemented.

In summary, the harvest of these products is consistent with LSR objectives where the existing elements and processes for late-successional conditions are not compromised. The following criteria should be considered to ensure LSR objectives are met:

1. Meet large woody material needs when cutting firewood, shakes, posts, poles, or bolts.
2. Harvest of material only where it is commonly found. Do not permit harvest on extreme ranges. This criteria applies to the following subjects or areas:
    a. No harvest of any product on the isolated granitic block in West IV LSR.
    b. No harvest of any sensitive or special status species.
    c. No harvest in specific niches such as the RNAs, Wildernesses and Botanical Areas.

Recreation Development. Given the low recreation use of the forest (FEIS, 1989) and the relatively large un-roaded areas and late-successional conditions, all currently planned recreation projects can be compatible with the objectives of the LSRs. The criteria of the Northwest Plan apply: 1. Use adjustment measures such as education, use limitations, traffic control devices, or increased maintenance when dispersed and developed recreation practices retard or prevent attainment of Late-Successional Reserve objectives.

*Post-Biscuit Condition***.** The fire burned numerous dispersed campsites, trailheads and structures. The most notable structure destroyed was Snow Camp Lookout, a popular recreation rental. Areas along the route of the T.J. Howell Memorial Drive also burned. Ninety-nine percent of the Kalmiopsis Wilderness was in the Recovery and much of it burned at varying intensity.

The largest impact of the fire on Forest recreation was damage to the trail system. Burn severity, slope, size of surrounding trees and other vegetative conditions affected the degree of trail damage. Greater burn severity destroyed more root structure, which is important in preventing soil erosion above and below trails. At numerous locations, as a result, the trail tread filled with ravel and slides, and the lower edge of the trail sloughed away. Some trail stretches are no longer discernible as trails.

Steeper side slopes aggravated the sloughing and sliding of materials onto the trails and there was additional damage to trails passing through large trees. Burned roots created large holes in the trail tread, up to one-third cubic yard in size. Many trees toppled onto trails creating access and safety problems. Dead trees will continue to fall for the next three to five years.

Repair and replacement of recreation facilities damaged or destroyed by the Biscuit fire were included in earlier NEPA documentation. Repairs began during the summer of 2003 and will continue for several years. The trail maintenance and repair workload will be heavy as dead trees continue to fall onto and across trails and brush encroachment increases dramatically.

Fire, a normal element of the Forest ecosystem, did not change recreation opportunities in the Recovery Area. For some visitors, the quality of recreational experiences was reduced and will be diminished until the area recovers.

Grazing: Very little range resource is available on the LSRs. Most of the range resource is associated with pastures in natural openings along the Rogue River and other meadows. The Medford BLM Area Plan and the Siskiyou Land and Resource Management Plan state the maximum acceptable annual utilization levels for the meadow sites. The Standards and Guidelines for Management of Habitat for the Northwest Forest Plan on page C-17 state: "Range Management - Range-related management that does not

adversely affect late-successional habitat will be developed in coordination with wildlife and fisheries biologists.

Adjust or eliminate grazing practices that retard or prevent attainment of reserve objectives. Evaluate effects of existing and proposed livestock management and handling facilities in reserves to determine if reserve objectives are met. Where objectives cannot be met, adjust livestock management and/or relocate handling facilities." Since most of the very limited range activities on the Forest are associated with meadows, range resource utilization will not affect the late-successional habitat. Also, by following the direction in the Forest Plan, the unique habitats found in the meadows will be maintained.

Mining. Mining within the province has occurred since the late 1800s and continues today. Many names of geographic features reflect the history of early mining in Southwest Oregon. Most goldbearing creeks and streams on federal lands have claims. Presently, much of the mining is recreational mining. Most of this activity involves a floating suction dredge to filter through streambed material and obtain gold. A number of commercial mining operations use larger mechanized equipment. The type of mining activity ranges from the weekend gold panner to the backhoe operator who may operate the entire season from June 15 through September 15. Within stream mining varies depending on the specific stream. Across the forest suction dredging can occur from June 15, to as late as October 31, but the season for individual streams can vary from two and a half months to three months on the forest. Timing of in water work periods is established by the Oregon Department of Fish and Wildlife.

The range of effects of suction dredges and other forms of mining vary in context and intensity. They need to be addressed on a site-by-site basis. NEPA provides the process for evaluating activities or impacts. Mining does not generally manipulate the habitat for late-successional species.

Other Projects. Most other projects such as easements, special use permits, bus tours, movies, waterlines, pow wows, sweat lodges, and passport-in-time efforts need evaluation at the project level. If potentially adverse effects on Late-Successional Reserve objectives could occur, these projects are subject to review by the Regional Ecosystem Office (ROD, page c-19).

IX. Monitoring Needs

Monitoring needs are an important component of this assessment. They are developed from the coarse and fine filter elements that describe existing and future conditions. Monitoring should be a continuous process of evaluating the difference between desired pattern, structure, or composition and the current status of these elements. Information gathered cycles back to planning which becomes and adaptive process. Implementation monitoring is already done under the Forest Plan monitoring plan. No additional implementation monitoring needs to be addressed.

Vegetation and wildlife conditions need to be monitored to detect new information and trends on elements and processes important for late-successional conditions.

A. Vegetation

Monitoring of the two most important elements of late-successional forests are the amount of large trees and the amount of interior late-successional habitat. As new inventories become available to replace the existing PMR database (National Forests) and existing GIS vegetation layer (BLM), these two elements should be reviewed again to determine changes in priority treatments or higher protection needs due to a changed condition. This is part of the ecological monitoring element contained in the Siskiyou Forest Monitoring Plan.

Mushroom harvest monitoring will be needed to ensure populations are kept viable, especially for those mushrooms listed in Table C-3 (Species to be protected through survey and management standards and

guidelines). Though these Table C-3 species will not be intentionally harvested, monitoring of their populations will minimize their impacts due to incidental harvest activity.

Specific needs for rare plants include: 1. Monitoring of population trends and habitat condition in LSRs for those rare plant species described in earlier sections as needing early-successional habitat. 2. Similar monitoring, when there is cause for concern, for those rare plant species described in an earlier section as occupying mid-successional, ecotonal, or special habitats in LSRs.

B. Wildlife

Survey and Manage species already have a monitoring strategy. The agencies just need to follow the survey and manage guidelines, as outlined in the latest Survey and Manage ROD, and keep results over time. As the agencies complete watershed analyzes, the results will describe trends in individual watersheds for important habitat elements such as snags, down wood, big trees, interior older forest patches, and unique habitat. These results are kept as reference and monitored to detect changes in the future.

Fauna. A copy of the Wildobs database needs to be queried at periodic intervals to monitor the known information of these species numbers and locations. Differences between time periods can then be assessed for population trends or inventory effectiveness.

C. Stream Flats

Continue to cooperate with the monitoring efforts of the Oregon Department of Fish and Wildlife, the Siskiyou National Forest, and Medford BLM District.

The aquatic elements of stream flats need to be monitored over time. The following types of monitoring activities are recommended:

-cross sections at riffles and pools to detect channel changes.
-temperature monitoring.
-pebble counts or other method of quantifying substrate materials.
-photo points for referencing changes in stream and riparian conditions.
-specific habitat typing and mapping of fish habitat to note changes over time.
-population estimates of spawning adults and/or rearing juvenile salmonids.
-aquatic insect (macro-invertebrate) sampling.

D. Conditions Which Require Reexamination

This assessment is an iterative document and will need to be kept up to date. Consequently, it will be kept in a three-ring binder so updates can be added as needed. The following items need to be considered for any updates:

1. For projects, is there sufficient information to make a reasonable prediction on the effect on Late-successional Reserves? The agency decisions need to be reasonable, not arbitrary, and not capricious. If more information is needed to make a management decision, this information will be gathered on a site-specific basis, or can be added to this LSR assessment.
2. Is there any new knowledge of species and habitat of late-successional conditions in southwestern Oregon that would change the agencies' management decisions? Examples of such new knowledge may include new inventories of habitat and new information on habitat requirements.
3. Fill in data gaps, as needed, for LSR management.

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